

WAR DEPARTMENT

**COAST ARTILLERY
FIELD MANUAL**



**ANTIAIRCRAFT ARTILLERY
SERVICE OF THE PIECE
3-INCH ANTIAIRCRAFT GUN**

January 17, 1942

FM 4-125

COAST ARTILLERY FIELD MANUAL



ANTIAIRCRAFT ARTILLERY SERVICE OF THE PIECE 3-INCH ANTIAIRCRAFT GUN

Prepared under direction of the
Chief of Coast Artillery



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COAST ARTILLERY FIELD MANUAL

ANTIAIRCRAFT ARTILLERY

SERVICE OF THE PIECE

3-INCH ANTIAIRCRAFT GUN

(This manual supersedes FM 4-125, May 27, 1940, including section II, Training Circular No. 4, War Department, 1941.)

CHAPTER 1

GENERAL

■ 1. SCOPE.—*a.* This manual prescribes a systematic procedure to be followed by gun crews of 3-inch antiaircraft guns manning matériel of the following types:

(1) The 3-inch antiaircraft guns M1917, M1917MI, and M1917MII on the fixed mounts M1917, M1917MI, and M1917MII.

(2) The 3-inch antiaircraft gun M3 on the mobile mounts M2A1 and M2A2.

(3) The 3-inch antiaircraft gun M4 on the fixed mount M3A1.

b. The matter contained in this manual is intended only as a guide in the assignment of individuals and duties; changes may be made to meet variations in the matériel manned.

■ 2. REFERENCES.—The references listed in the appendix should be consulted, especially those pertaining to ammunition and to the operation, care, and maintenance of matériel.

CHAPTER 2

ORGANIZATION OF GUN SECTION

■ 3. GUN SECTION.—The gun section is a part of the firing section, which consists of four gun sections and a machine-gun and executive officer's detail. Two artillery mechanics are assigned to the firing section and are part of the machine-gun and executive officer's detail for purposes of supervision and formation. Each antiaircraft gun is manned by a gun section consisting of a gun squad and an ammunition squad. The gun commander, who is included in the gun squad, serves as chief of section.

■ 4. GUN SQUAD.—The gun squad (11 enlisted men) consists of the gun commander (a sergeant), the fuze range setter (a corporal), the gunner (a corporal), the azimuth setter, the elevation setter, and 6 cannoneers numbered from 1 to 6, inclusive. It includes the number of men required to man the 3-inch antiaircraft gun (mobile or fixed).

■ 5. AMMUNITION SQUAD, MOBILE UNITS.—In mobile units the ammunition squad consists of the chief of ammunition (a corporal) and 9 cannoneers numbered from 7 to 15, inclusive. Nos. 11, 12, and 13 are chauffeurs in addition to being cannoneers. Nos. 14 and 15 are basics.

■ 6. AMMUNITION SQUAD, SEMIMOBILE UNITS.—In semimobile units the ammunition squad consists of the chief of ammunition (a corporal) and 6 cannoneers, numbered from 7 to 12, inclusive.

■ 7. FORMATION (fig. 1).—The battery is formed as prescribed in FM 4-120. The gun section assembles in two ranks with 4 inches between files and 40 inches between ranks. After forming the section, the gun commander takes post in the front rank 1 pace to the right of his section.

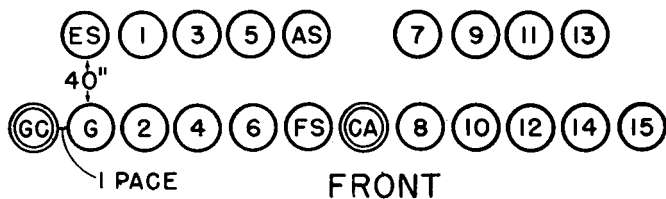


FIGURE 1.—Formation of 3-inch antiaircraft gun section.

NOTE.—In semimobile units Nos. 11, 12, and 13 (chauffeurs) are eliminated and Nos. 14 and 15 (basics) become Nos. 11 and 12.

CHAPTER 3

DUTIES OF PERSONNEL

■ 8. BATTERY EXECUTIVE.—*a.* The battery executive commands the firing section and is in general charge of all gun emplacements. He is responsible to the battery commander for the—

(1) Training and efficiency of the personnel of the firing section.

(2) Condition of matériel and ammunition under his charge.

(3) Police of the emplacements.

(4) Emplacement and removal from position of the guns.

(5) Observance of all safety precautions pertaining to service of the piece.

b. He inspects all matériel and ammunition under his charge. He personally verifies adjustment of all pointing devices as frequently as is necessary to insure accuracy. He tests all firing devices before each firing, paying special attention to safety features.

c. At the command PREPARE FOR ACTION, given while the guns are on the road in march order, the battery executive designates the individual positions to be occupied by the guns and supervises the movements into position and the preparation for immediate action.

d. He verifies filling of recoil cylinders and adjustment of recuperator systems, sees that there is no obstruction to the operation of the carriage in recoil or counterrecoil, and, so far as possible, verifies adjustment of all parts that move in recoil or are affected by it.

e. He is responsible for orienting the guns.

f. He assists the range officer in synchronizing the data transmission system.

g. He receives reports of the assistant battery executive or gun commanders and reports to the battery commander. "Sir, firing section in order," or reports any defects he is unable to remedy without delay.

h. After the firing section has been reported in order, if any circumstances arise which in his opinion make it unsafe to fire, he commands: STAND FAST, and reports his action to the battery commander.

i. He is responsible that fire is commenced immediately when ordered by the battery commander, safety precautions permitting.

j. At the conclusion of the drill or firing he commands: **REPLACE EQUIPMENT**, inspects the gun positions, and reports to the battery commander.

k. Being in position, at the command **MARCH ORDER**, the battery executive indicates the point of assembly for the guns on the road and supervises the operation.

■ **9. ASSISTANT BATTERY EXECUTIVE.**—*a.* The assistant battery executive commands the machine-gun detail, and supervises handling of all ammunition for the battery. He is responsible to the battery executive for the—

(1) Training and efficiency of personnel of the machine-gun detail.

(2) Condition of matériel and ammunition under his charge.

(3) Observance of all safety precautions pertaining to service of the piece for machine guns.

(4) Police of the machine-gun positions.

(5) Emplacement and removal from position of machine guns.

b. He is responsible that the record of ammunition expended is entered accurately in all gun books.

■ **10. GUN COMMANDER.**—*a.* The gun commander (a sergeant) is in charge of the gun section and is also chief of the gun squad. He is responsible to the battery executive for the—

(1) Training and efficiency of the personnel of his section.

(2) Condition, care, and preparation for action of all matériel and ammunition under his charge.

(3) Observance of all safety precautions pertaining to the service of the piece.

(4) Police of his gun position.

(5) A record of the number of rounds fired from his gun.

(6) Care and correct return of empty ammunition cases to the proper agency.

(7) Enforcement of camouflage and gas discipline.

b. At the command **PREPARE FOR ACTION** given while the gun is on the road in march order, he directs the maneuver of the gun into its designated position and the uncoupling of the gun from the truck, and supervises the preparation of

the position. After the gun is emplaced, ready for firing, or the section arrives at the gun position, he commands: 1. DETAILS, 2. POSTS, and supervises the procurement of equipment. After all details have reached their posts, he commands: EXAMINE GUN. He then personally makes an inspection of the gun, carriage, and other matériel, assuring himself that the gun is properly emplaced for firing, that the data transmission system is properly adjusted, that the recoil cylinder is properly filled, and that all moving parts are lubricated. In addition, on the M1 and M3 guns, he makes sure that the oil reserve in rear of the floating piston and the air pressure in the recuperator are sufficient and that the equilibrators are in proper adjustment. He then commands: REPORT, receives the reports of the members of the gun section as called for in the drill table (ch. 11), and reports to the battery executive, "Sir, No. ——— in order," or reports any defects he is unable to remedy without delay.

c. He supervises the service of the piece and the service of ammunition and personally directs the work of care and preservation of all matériel. He takes his post at any point from which he may conveniently supervise the work of the section.

d. When necessary to verify the section, he commands: CALL OFF. The cannoneers of the section call off their titles or numbers in succession, beginning with the unnumbered members of the section, followed by the numbered members in order.

e. At the command TARGET, he repeats the command and target designations and sees that all personnel take post on the run if not already at their posts. When data are being received and set on the gun he verifies roughly the pointing of the gun by sighting along the gun barrel; when the gun is ready for firing he reports or signals, "No. ——— ready," to the battery executive.

f. At the command COMMENCE FIRING, he commands: LOAD, for the first round only, succeeding rounds being fired without further command, and supervises the work of the section. If a limited number of rounds has been prescribed, he cautions the loader, "(So many) rounds only," and commands or signals: SUSPEND FIRING, when that number of rounds has been fired. He then reports to the battery executive, "Sir, No. ——— (so many) rounds fired."

g. At the command **SUSPEND FIRING**, he repeats the command, sees that the details remain posted, and that the gun continues to follow the target. He directs the clearing away of empty shell cases and preparation of matériel for further firing.

h. At the command **CEASE FIRING**, he repeats the command and proceeds as at **SUSPEND FIRING**, except that the following of the target is discontinued.

i. At the command **REST**, he repeats the command and allows the members of the section to leave their posts but not the immediate vicinity of the gun.

j. At the command **REPLACE EQUIPMENT**, he supervises the replacing of equipment, sees that the emplacement is policed, and forms his section.

k. In case of misfire he commands: **STAND FAST**, and sees that the precautions prescribed in paragraph 21b are observed.

l. At the command **MARCH ORDER**, for mobile guns he supervises the withdrawal of the gun from position and the placing of the piece on the road at the designated point.

■ **11. CHIEF OF AMMUNITION.**—*a.* The chief of ammunition (a corporal) is in charge of the ammunition squad. He is responsible to the gun commander for the—

(1) Training and efficiency of the personnel under his charge.

(2) Proper care of the ammunition pertaining to the gun.

(3) Observance of all safety precautions in the care and service of the ammunition.

(4) Correct recording of required ammunition data.

(5) Cleaning and disposition of empty cartridge cases.

(6) Uninterrupted service of ammunition to the gun position during the course of action.

(7) Enforcement of camouflage and gas discipline at ammunition shelters.

b. At the command **PREPARE FOR ACTION**, he supervises the ammunition squad in the unloading and preparation of ammunition for service and in other duties connected with the preparation of the emplacement as may be directed by the gun commander.

c. At the command 1. DETAILS, 2. POSTS, he posts the members of the ammunition squad and assigns them duties to facilitate ammunition handling.

d. At the command EXAMINE GUN, he inspects the ammunition for possible defects (especially the fuzes for missing lugs, corrosion, and injury), gives the necessary instructions for preparing and arranging the ammunition for firing, and reports to the gun commander, "Ammunition service in order," or reports defects he is unable to remedy without delay.

e. During practice or action he supervises the ammunition squad in replenishing the ammunition supply at the gun position, in disposing of empty cases, and in the handling and storing of any additional supply received. He should be prepared at all times to furnish replacements for the gun squad when members of that squad become casualties.

f. He is prepared to furnish information as to powder temperature when called upon by the 'battery officers to do so.

g. At the command REPLACE EQUIPMENT, he directs the ammunition squad in the securing and covering of all ammunition pertaining to the gun, makes certain that all fuzes that have been cut but not fired have been set back to positions of "safe," helps in the police of the equipment, and forms his squad unless otherwise directed.

h. At the command MARCH ORDER, he supervises the ammunition squad in their normal duties in connection with packing and loading ammunition and in such other duties as may be ordered by the gun commander.

■ 12. ARTILLERY MECHANICS.—The chief artillery mechanic is the custodian of the supplies pertaining to the emplacements to which assigned. He is responsible to the battery executive for the condition and serviceability of the supplies and tools under his charge. He maintains an up-to-date inventory of all tools, equipment, spare parts, and supplies under his charge. He or his assistant issues such equipment, tools, oils, paints, and cleaning materials to the members of the gun sections as may be necessary for the service and care of the guns and accessories. The artillery mechanics, assisted by members of the gun sections, make such minor repairs as can be made with the means at hand.

CHAPTER 4

NOTES ON SERVICE OF THE PIECE

■ 13. GENERAL INSTRUCTIONS.—The service of the piece should be conducted with dispatch and precision and with as few orders as possible. Except for the necessary orders, reports, and instructions, no talking should be permitted. Cannoneers change positions at a run. Loading with dummy ammunition and pointing the piece as for firing is the normal practice at drills. The commands or signals ELEVATE, DEPRESS, RIGHT, and LEFT refer to the direction of motion of the muzzle of the gun. Commands should be given in the prescribed form but should be replaced by signals whenever practicable.

■ 14. OPERATION OF BREECH MECHANISMS.—a. The breech mechanisms on all guns discussed in this manual are fully automatic. Inserting a cartridge trips the extractors and allows the block to close. The breechblock is opened by the action of the operating cam and the operating shaft in counterrecoil.

b. The breech mechanisms are furnished with operating handles and may be set for hand operation by rotating the operating cam so that it does not come in contact with the operating shaft. In normal operation the operating handle is fastened to the shaft in such a way that when the handle is rotated to the rear and down it causes the breechblock to open. Movement of the handle back to the vertical position, however, does not move the block. A clutch is provided to fasten the operating handle rigidly to the shaft if desired.

■ 15. METHOD OF RAMMING CARTRIDGE.—The cartridge is rammed into the gun with the left hand. Place the gloved fist on the base of the cartridge case, wrist practically vertical, and sweep the round smartly into the breech, applying continuous pressure, until the closing breechblock knocks the hand clear. The cartridge is rammed with the side of the fist, the pressure being applied through the back of the thumb and the side of the index finger. In this manner continuous pressure can be applied and the hand cannot be caught in the breech. Figure 2 illustrates the proper method of ramming.

■ 16. METHOD OF HANDLING AMMUNITION AND FUZE SETTER M8.—*a.* (1) The first ammunition handler takes a round from the stack near the piece, right hand grasping the projectile, left hand near the base of the round. He turns to the right and passes the round to the next ammunition handler. The second ammunition handler takes the round in his upturned palms, right hand near the base, left hand near the projectile, turns to the left, and lifting the round to the level of his eyes passes it to the ammunition handler stationed on the mount platform slightly to the rear and left of the fuze setter guide. The ammunition handler on the mount platform turns to the right to receive the round from the second ammunition handler. Then holding the fuze toward the setter, left hand grasping the projectile and right hand cupped over the cartridge base, he turns to the left and advances a step toward the setter raising the base end to aline the round with the axis of the setter. As the fuze enters the setter guide, he withdraws his left hand. With his right hand he pushes the round downward into the setter, leans forward, and while balancing himself with his right hand by pressing against the base end of the case, brings his left hand over and sharply slaps the release lever located on the top side of the fuze setter. He maintains pressure on the base of the round until the fuze setter operator has completed one turn of the crank and called out "Cut." He then straightens up, steps back, and on receiving the next round repeats the operation.

(2) After the fuze setter operator calls "Cut," the relayer withdraws the round from the fuze setter, steps toward the gun, and holds the round in loading position for the gunner.

b. The fuze setter operator, standing on platform alongside of the seated fuze range setter, maintains a downward pressure on the handle of the fuze setter crank. When the round is seated in the fuze setter and the setting release has been tripped, the fuze setter operator operates the crank one complete turn counterclockwise until the crank relocks and then calls "Cut." The fuze range setter, seated on the one seat of the setter, maintains pointer coincidence in the data indicator by manipulating the adjusting handwheel. Figures 2 and 3 illustrate the service of ammunition to the fuze setter and to the breech.

c. Points of particular importance in the foregoing procedures are as follows:

(1) When the round is in the fuze setter, pressure should be maintained against the base of the cartridge case until the call "Cut" is heard. The use of a heavy glove on the right hand of the ammunition handler who maintains such pressure will greatly reduce the friction against his hand produced by the rotating case.

(2) The release lever on the fuze setter should be tripped with a *glancing* slap at the release lever so that the latter will instantly recover and rearm itself before a full revolution of the crank has been completed.

(3) Sufficient downward pressure must be maintained on the crank of the fuze setter so that the rotation will start the instant the release is tripped. Otherwise the release lever would have to be held down and the release would probably fail to rearm in time for the crank at the end of its one revolution. When setting original or reconditioned Mk. III or Mk. IIIA1 powder train fuzes, the setting crank of the fuze setter should be turned at a moderate speed until the setting

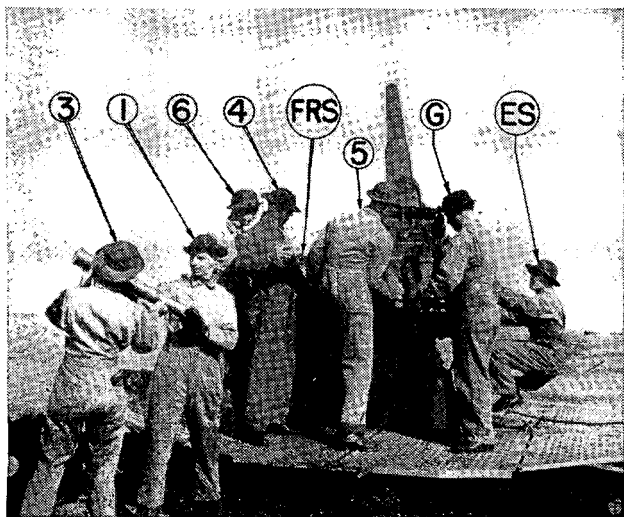


FIGURE 2.—Round being rammed, M3 gun on M2A1 mount

pawls have engaged the body lug of the fuze, after which the crank may be speeded up for the remainder of the setting cycle. The body lug in the above type fuzes will not withstand the pick-up force which may be applied by the high speed of the M8 fuze setter.

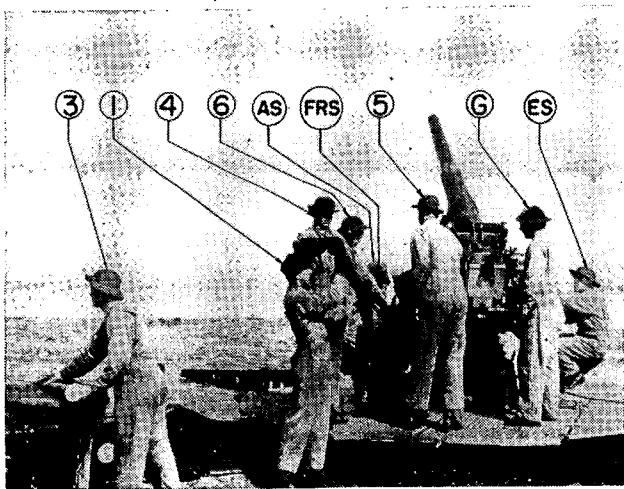


FIGURE 3.—Round leaving continuous fuze setter, M8.

■ 17. SERVICE OF DRILL AMMUNITION.—When using drill ammunition, the procedure is identical with that given in paragraph 16, except as follows:

a. (1) A cannoneer takes post to the right of the piece opposite the operating handle and facing the rear. He opens the breech for each round after the lanyard has been pulled, and immediately raises the operating handle to the vertical position.

(2) Two additional cannoneers are necessary. When the firing of a round has been simulated, the cannoneer adjacent to the operating handle opens the breech smartly. As the round is ejected, it is caught by a cannoneer standing on the ground directly behind the breech. The round is caught with the left hand against the base and the right hand underneath the case. He clears the breech immediately for the

insertion of another round, and places the ejected dummy round on the ammunition rack.

b. An alternate method is as follows: a cannoneer takes position on the ground behind and slightly to the right of the breech in such a way that he can catch each round as it is ejected and pass it to another cannoneer. The round is relayed from one cannoneer to another until it reaches the ammunition rack. The gunner operates the operating handle to open the breech after each round has been placed in the breech and the breechblock returned to firing position. In this method the lanyard is not pulled.

■ 18. ELEVATING GUN (M1917, M1917MI, and M1917MII).—When the gun mounted on the 3-inch antiaircraft gun mount M1917 is depressed with a perceptible jar against the stop which limits depression, it is very difficult to start the gun in elevation. This is caused by the elevating worm becoming locked with the worm gear. The elevation setter should depress gently when approaching this stop.

CHAPTER 5

SAFETY PRECAUTIONS

■ 19. GENERAL.—*a.* Safety precautions to be observed in time of peace are discussed in FM 4-120.

b. The more important safety precautions pertaining to the gun section are described in this chapter.

c. The principles indicated in the precautions referred to in *a* and *b* should be applied under war conditions where circumstances permit.

■ 20. AMMUNITION.—*a.* All ammunition at the firing point must be so placed that it will be protected against explosion in case of an accident at the gun position. It should be in a dry place and protected from the direct rays of the sun by a tarpaulin or other covering. Erratic shots and possible dangerously high powder pressures may result from overheated ammunition.

b. Any alteration of loaded ammunition, except in accordance with specific instructions from the chief of the supply service concerned, is hazardous and is therefore prohibited. Specifically, the alteration of time fuzes assembled to ammunition is forbidden.

■ 21. MISFIRES.—*a.* A misfire is said to occur when the piece fails to discharge when an attempt to fire it has been made.

b. In case of a misfire, at least three attempts to fire the primer will be made. The breechblock will not be opened until at least 2 minutes after the last attempt to fire the piece, and the gun will be kept laid on a safe place in the field of fire.

■ 22. FUZES.—*a.* When checking the accuracy of fuze setting by cutting trial fuzes, do not cut the fuze on any one projectile more than twice.

b. After a fuze has been set, if the round is not fired, it must be set back to "safe" (powder train fuzes are set back to *S*, and mechanical fuzes to position with "set" line on lower cap in line with edge of slot in body). This is done by setting the fuze setter to that reading and then resetting the fuze.

■ 23. UNLOADING LIVE ROUNDS.—If a round cannot be extracted in the normal manner, it should be fired, safety pre-

cautions permitting. If this is impossible, it should be removed under the direct supervision of an officer, a rammer being used which bears only on the projectile and provides for clearance around the fuze (see TM 9-360).

■ 24. GENERAL PRECAUTIONS FOR DRILL AND FIRING.—*a.* No live ammunition will be allowed near the emplacements except when firing is to take place.

b. The gun will be unloaded except when firing or about to fire.

c. Members of the gun section will be trained always to pass in rear of the gun and well clear of the breech in going from one side to the other.

CHAPTER 6

MAINTENANCE OF MATÉRIEL

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SECTION I

GENERAL

■ 25. CARE OF MATÉRIEL.—The proper maintenance of matériel is the direct responsibility of battery personnel. The gun and mount should be thoroughly cleaned and lubricated at intervals not exceeding 2 weeks and as soon as possible after firing. Care should be taken to keep all parts free from rust, as rust is the starting point of serious injury. All bearing surfaces, elevating racks and screws, and unpainted parts must be kept clean at all times.

■ 26. INSTRUCTIONS.—*a.* Disconnecting the gun from the recoil mechanism will not be attempted by the using personnel.

b. Replace and open cotter pins after replacing nuts.

c. Do not strike any metal parts directly with a hammer; interpose a buffer of wood or copper.

d. Oil holes which have become clogged with oil should be opened with a piece of wire. Wood should never be used for this purpose, as splinters are likely to break off in the hole.

e. As an aid to ready identification, grease and oil fittings and oil holes are painted red. Oil holes have a red ring painted around them.

f. In case the gun and carriage are to be stored or left unused for any considerable length of time, all bright and unpainted surfaces should be thoroughly cleaned with dry-cleaning solvent so as to be free from rust, water, and lubricating oil, and coated with rust-preventive compound. Dry-cleaning solvent is used in preference to kerosene for cleaning the matériel as it is difficult to remove all traces of kerosene, the presence of which tends to cause the formation of rust underneath the rust-preventive compound.

■ 27. DAILY INSPECTION.—When guns are in position a daily check should be made by members of the gun section to dis-

cover any parts which need cleaning, oiling, repair, or adjustment. The inspection is supervised by the gun commander. The procedure is as follows:

a. Open and close breech to see that it operates freely, and check its automatic closing mechanism.

b. Examine breech recess and bore to see that they are clean.

c. See that the firing mechanism works freely and that the firing pin is in serviceable condition.

d. Check amount of oil reserve present in recoil mechanism and examine recoil system for oil leaks.

e. Check air pressure in recoil and equilibrators mechanisms.

f. Elevate and depress the gun to see that the mechanism operates easily and without binding or undue lost motion, and that equilibrators are properly adjusted.

g. Traverse the gun to the right and to left through 360° to see that the mechanism operates easily and that the data transmission plug is in order.

h. See that sliding surfaces of the gun and cradle are clean and well lubricated.

i. See that all working parts are properly lubricated.

j. See that tools and accessories are in good condition, that they are in their proper places, and that none are missing.

k. Check shafts and gears connecting data receivers to the gun.

■ **28. WEEKLY INSPECTION.**—Each week, and more often if amount of firing warrants, the gun and carriage should be thoroughly inspected by the battery commander. The instructions given for daily inspection by the gun section should be carried out and in addition the following directions should be observed:

a. Examine bore with extreme care to see that erosion has not set in. If there are any signs of erosion, that fact should be reported.

b. Operate all moving parts and see that they work freely and correctly.

c. Examine all nuts to see that they are tight and that split pins are in place where required.

d. Examine data transmission system to see that it is in proper operating condition.

- e. Examine condition of paint.
- f. Examine all small parts such as keys and hinges to see that they are in serviceable condition.

SECTION II

MAINTENANCE OF PARTICULAR PARTS AND ASSEMBLIES

■ 29. GUN.—*a.* As soon as possible after firing, the bore must be cleaned to remove all powder fouling and then thoroughly oiled. Using the sponge covered with burlap, wash the bore with a solution made by dissolving $\frac{1}{2}$ to 1 pound of soda ash (depending on strength desired) to 1 gallon of boiling water. Special attention should be given that portion of the bore extending from the origin of the rifling to a point about 24 inches forward, as most of the fouling takes place in that area. After cleaning the bore, wipe it thoroughly dry, using the sponge covered with burlap. Then oil the bore with a light coating of rust-preventive compound applied with the slush brush.

b. The surfaces of the leveling plates sunk into the top of the breech ring should be protected from injury. Tools or other articles must never be laid upon them.

c. When the gun is not in use the various covers provided for protecting it must be placed in position.

■ 30. BREECH MECHANISM.—*a.* The breech mechanism should be kept clean and well lubricated at all times with oil, engine SAE 10 W or SAE 30 (depending on whether temperature is above or below 32° F.). The mechanism should be disassembled periodically (and always immediately after firing) and cleaned and oiled. In case the mechanism is to be left unused for a considerable length of time all bright surfaces should be coated with rust-preventive compound.

b. Vigilance must be maintained to detect any abrasions forming on the pressure side of the wearing surfaces in the various grooves of the breechblock and the breech recess and on the trunnions of the extractors. The removal of such abrasions must be done at once by ordnance personnel.

■ 31. FIRING MECHANISM.—*a.* The firing mechanism should be disassembled frequently from the breechblock for the purpose of cleaning and for oiling with light lubricating oil.

b. The use of an oil that is thicker than authorized will cause the mechanism to absorb the energy of the firing spring and result in misfires. This is especially true in cold weather when unsuitable oil congeals and becomes gummy.

■ 32. RECOIL MECHANISM.—a. Under no circumstances will an attempt be made to take the recoil mechanism apart. Adjustment of the recoil valve (10) (fig. 10) may be undertaken only by competent ordnance personnel; the removal of the throttling valve cover by the using service is prohibited.

b. The proper amount and kind of oil should be maintained at all times in the recoil mechanism. The following table shows the amount and kind of recoil oil to be used for mobile gun mounts when used under different climatic conditions:

RECOIL OIL FOR MOBILE GUN MOUNTS

3-inch anti-aircraft gun carriage	When temperature averages above 40° F.	When temperature averages 40° F. or below	Recoil mechanism capacity (pints)
T1A1 ¹ -----	Heavy, Specification RIXS-121, revision 3 ²	Light, Specification RIXS-189.	³ buffer 3¼
T1A2 ¹ -----	do-----	do-----	Do.
M1A1 ¹ -----	do-----	do-----	Do.
M1A2 ¹ -----	do-----	do-----	Do.
M2 ¹ -----	do-----	do-----	Do.
M2A1 ¹ -----	do-----	do-----	Do.
M2A2 ¹ -----	do-----	do-----	Do.
M1918-----	Light, U. S. Army Specification 2-36.	do-----	10¾ buffer 3¼

¹ Recoil mechanism valve setting should be 1¾ turns open from the closed position when recoil oil meeting Specification RIXS-189 requirements is used.

² When recoil oil meeting requirements of U. S. Army Specification 2-96A (heavy) supersedes recoil oil meeting the requirements of Specification RIXS-121, revision 3, it will be applicable to this matériel (now proposed but not fully adopted).

³ Plus 1 pint reserve.

c. Every precaution should be taken to prevent the entrance of foreign matter into the recoil mechanism.

d. Strain the oil used in filling the recoil mechanism through a fine, clean cloth, and be sure that the receptacles used in handling the oil are clean and dry. Receptacles that have been used for other oils or materials should not be used for this purpose.

e. The gun commander should constantly verify the complete return of the gun into battery. If the gun does not return to battery, or does so irregularly by jerks or jumps, he should command **CEASE FIRING** and look for the cause.

■ 33. **GUN SLIDES.**—The gun slides will be thoroughly cleaned frequently and covered with a film of grease, general purpose, No. 0.

■ 34. **MOUNT.**—The exposed portions of the elevating rack, and on mobile mounts the exposed parts of the leveling screws and guides, will be kept clean and covered with a film of grease. Great care will be taken to make sure that the traversing and elevating mechanisms are clean and properly lubricated.

CHAPTER 7

EMPLACEMENT AND PREPARATION FOR MARCH OF
M3 GUN ON M2A1 OR M2A2 MOUNT

■ 35. GENERAL.—The duties of the various members of the gun section in emplacing the M3 guns on mobile mounts are given in table II, chapter 11, and are shown diagrammatically in figure 4. The explanation given below is descriptive of the operation of maneuvering the mount into and out of position. In this description the end of the mount equipped with the muzzle rest is considered the rear of the mount. The right and left are determined by the right and left of an observer at the rear of the mount facing toward the front of the mount. The bogie with the steering mechanism is called the front bogie and supports the front end of the mount when in traveling position. The bogie with the hand brake mechanism is called the rear bogie and supports the rear end of the mount when in traveling position. The mount is always towed with the gun locked by the muzzle clamp and pointed to the rear.

NOTE.—The rear bogie should be removed last and replaced first because it is at the end of the mount having the preponderance of weight.

■ 36. PROCEDURE TO PREPARE FOR ACTION (see fig. 5 for names of parts).—The following is an explanation in chronological order of the maneuver of preparing for action:

a. At the command PREPARE FOR ACTION, given by the gun commander, the jack float channel is put in place, the jack lever ratchets are put in neutral, and the lifting jacks are run down by means of the fast motion handwheels until the floats are in contact with the channel. The jack lever ratchets are then set for "jacks down." While this is being done front bogie and outrigger clamp screws are unlocked.

b. At the command JACKS DOWN, the two lifting jacks are run down together by means of the jack levers until the mount has been raised sufficiently to remove the front bogie.

c. At the command JACKS HALT, the elevation and azimuth seats are unlocked from the traveling position and swung out from the mount, and the front bogie is removed. The front outriggers are unfolded, wedged, and swung outward to their stops. Rear bogie and outrigger clamp screws are then unlocked. The mount is then tipped by means of the

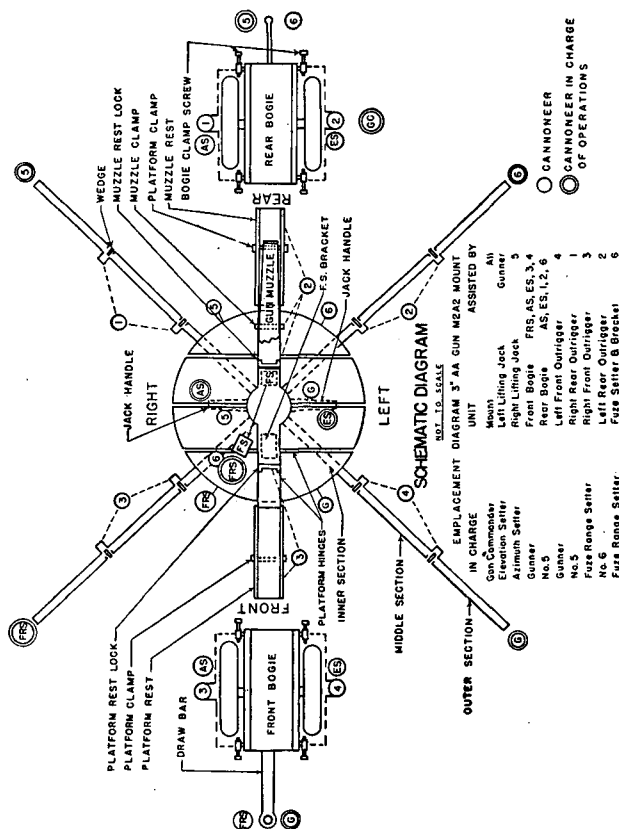
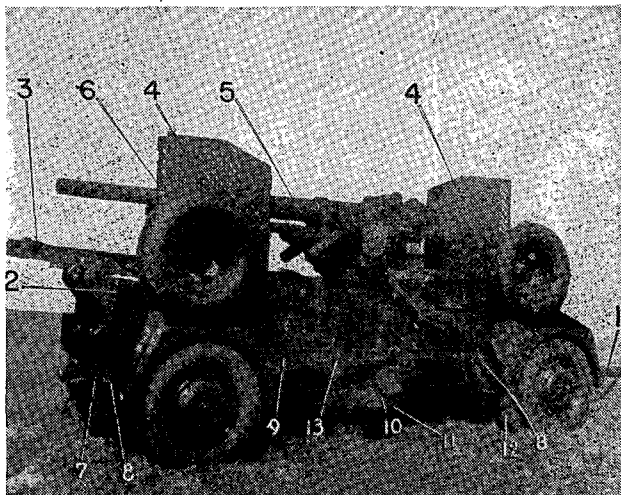


FIGURE 4.—Emplacement diagram, 3-inch gun on M2A1 or M2A2 mount.

unfolded outriggers, and the rear bogie is removed. The rear outriggers are then unfolded, wedged, and swung outward to their stops.

■ 37. DUTIES OF GUN COMMANDER IN EMPLACING MOUNT.—At the command PREPARE FOR ACTION, the gun commander repeats the command, directs the maneuvering of the gun into the designated place and the uncoupling of the gun from its truck, and supervises the emplacing of the gun. When both lifting jacks are down with the floats in contact

with the jack float channel and the bogie clamp screws are released, he commands: **JACKS DOWN**. After the mount has been raised sufficiently to remove the front bogie, he commands: **JACKS HALT**. When the bogies have been withdrawn and the outriggers unfolded, wedged, and swung to their stops, he commands: **JACKS UP**, and sees that the mount is kept level during the operation. When the mount is resting on the ground, he directs the details of completing the emplacement and leveling the mount.



- | | |
|---|------------------------------|
| 1. Lunette. | 7. Rear (trailing) bogie. |
| 2. Outrigger, intermediate section. | 8. Bogie clamp screws. |
| 3. Outrigger, outer section. | 9. Platform support bracket. |
| 4. Platform. | 10. Pedestal spade. |
| 5. Gun (M3). | 11. Jack. |
| 6. Platform traveling support and gun lock. | 12. Front (towing) bogie. |
| | 13. Jack ratchet wrench. |

FIGURE 5.—3-inch anti-aircraft gun M3 on M2A1 mount in traveling position.

■ **38. PROCEDURE TO TAKE UP MARCH ORDER.**—It may be stated as a general principle that the details handle the same elements of matériel in preparing the gun for the road (march order) as they handle in preparing it for firing. The follow-

ing is an explanation in chronological order of the maneuver of taking up march order:

a. At the command **MARCH ORDER**, given by the gun commander, the fuze setter and fuze setter bracket are removed from their firing positions and replaced in their traveling positions, and the azimuth and elevation seats are unlocked from their firing positions. The muzzle and platform rests are replaced and locked into their traveling positions, and the gun is traversed and depressed until the muzzle clamp can be locked. The platform sections are unlocked from their firing positions, folded up, and locked to the muzzle and platform rests. The lifting jack lever ratchets are shifted, and at the command **JACKS DOWN** the jacks are run down until the mount has been raised sufficiently to break the outriggers loose from the ground. At the command **JACKS HALT**, the wedges are driven from the rear outriggers, which are folded, swung against the mount, and locked.

b. At the further command, **JACKS DOWN**, both lifting jacks are run down together until the mount has been raised sufficiently to allow replacing of the bogies.

c. At the command **JACKS HALT**, the lifting jacks are stopped and the rear bogie is run into position and locked to the mount. The front outriggers are then folded, swung against the mount, and locked. The front bogie is then run into position.

d. At the command **JACKS UP**, the mount is lowered until it rests on the front bogie, and is locked thereto. If the mount is equipped with air brakes (M1A1 and M2A1 mounts), the rear bogie is coupled to the mount air line. When the mount is equipped with electric brakes (M2A2 mount), the electric cable is connected to the sockets in each of the bogies. The jacks are then raised by means of the fast motion handwheels until the stops are reached. The jack float channel and the azimuth and elevation seats are secured in their traveling positions.

■ **39. DUTIES OF GUN COMMANDER IN TAKING UP MARCH ORDER.**—At the command **MARCH ORDER**, the gun commander repeats the command and supervises the maneuver. After the platform sections have been locked in their traveling positions, he commands: **JACKS DOWN**. When the outriggers are broken loose from the ground, he commands: **JACKS**

HALT. After the rear outriggers have been locked in their traveling position, he commands: **JACKS DOWN.** When the mount has been raised sufficiently to allow replacing the bogies, he commands: **JACKS HALT.** When the bogies have been locked into position, he commands: **JACKS UP.** He then directs the details of completing the maneuver and the moving of the gun to its designated place in the column.

■ 40. **PRECAUTIONS.**—*a.* The gun should be emplaced on turf or soft ground such as a plowed field whenever possible. The terrain should be examined to insure that no rocks or other unyielding substances are concealed under the areas where the pedestal spade and the outriggers rest. The presence of such obstructions will cause the mount to shift badly during firing. If necessary to emplace on hard ground, the ground should be loosened with a pick over an area sufficient to engage the spade and outriggers of the mount; two settling shots should be fired at approximately the maximum elevation of the gun to drive the spade into the ground, and the mount should be releveled. On uneven ground, with a slope greater than 5°, the area under the spade and outriggers should be roughly leveled, as the leveling mechanism of the mount is limited to an adjustment of 5°.

b. The weight of the gun and mount should not be supported by the outriggers but should rest on other parts of the undercarriage designed for contact with the ground surface. The outriggers are intended to prevent overturning and shifting of the mount during firing but not to support weight. When filling in under outriggers, loose dirt should be used and no effort should be made to pack it in. The unfolded outriggers should be spread fully to their stops during the time that the mount is supported only by the lifting jacks, to prevent overturning of the mount if one of the jacks starts to run down. This position of the outriggers will prevent the overturning of the mount.

c. In removing the bogies, the screws fastening the bogie frames to the mount should be released just before the load is taken by the lifting jacks. This is to prevent the bogies being raised off the ground and jamming. In removing and replacing the bogies, the mount may be maneuvered by the extended outriggers.

d. Before firing be sure that the lifting jacks are fully raised.

e. The mount should be releveled and then reoriented after firing the first few shots.

f. When the mount is provided with air brakes, dummy couplings are provided near all air couplings for sealing the latter when not in use. Whether the air couplings between the mount proper and the bogies are manually or automatically disengaged, the coupling halves should be manually sealed with these dummies to prevent fouling of the coupling gaskets and interior of the air system. Malfunction of the brake air chambers or quick release valve on rear bogies will result if air lines are not kept free from dirt and other foreign substances.

g. Before maneuvering the bogies, the drawbars must be locked in position. If the front drawbar is not made rigid with the bogie frame, the maneuvering hook-up assembly may collapse when the crew attempts to remove the bogie.

h. Care must be taken that the rear leveling lever is not manipulated while the gun is secured to the traveling lock, as the elevating rack will rotate the elevating pinion and ruin the pinion shaft which is splined into a nonreversing worm wheel at its other end.

CHAPTER 8

3-INCH ANTIAIRCRAFT GUN M3 ON MOBILE MOUNT

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II. Disassembly of breech and firing mechanisms.....	42-46
III. Assembly of breech and firing mechanisms.....	47-53
IV. Check and replacement of oil and gas in re- cuperator and equilibrators.....	54-61
V. Installation of chain connecting floats of jacks..	62
VI. Lubrication.....	63-66

SECTION I

GENERAL

■ 41. GENERAL.—This chapter contains special information for the use of gun crews of antiaircraft batteries manning M3 guns on mobile mount. It is intended that the instructions be used as a guide in the proper care and handling of this particular type of matériel.

SECTION II

DISASSEMBLY OF BREECH AND FIRING MECHANISMS

■ 42. LATCH PLATE (fig. 6).—Unscrew the latch bolt set screw (6) and unscrew the latch bolt (21). This will release the latch (20) and spring (18) in spring cup (19) from the latch plate.

■ 43. BREECHBLOCK.—*a.* Remove one of the cap screws from the breech lamp bracket, loosen the other cap screw, and swing the lamp assembly clear of the breech recess. Unscrew plugs (5) (fig. 7) and remove extractor springs and plungers (6) and (9). Screw an eyebolt in the top of the breechblock for use in lifting the block. Open the breech and insert a pin or punch in the opening in the spring piston rod (27) (fig. 6) at the rear face of the closing spring cylinder (22), thereby releasing the tension of the spring on the breechblock. (See note below.) Screw in the clutch (11) (fig. 8) and close the breech. Remove the cotter pin which retains the chain terminal and unhook the chain from the operating shaft.

b. Draw the trigger shaft detent (1) (fig. 7) to the left by the handle (2) and draw out the trigger shaft (13) (fig. 8). Remove the firing case (41) (fig. 9) by turning until the

locating lugs are disengaged. Remove the split pin from the lock plate key (2) (fig. 6) and drive out the key. Remove the lock plate (4).

c. Rotate the operating shaft (3) (fig. 8) as in opening the breech. When the arm of the operating shaft turns out of the breechblock, draw the shaft to the rear out of the breech ring. It may be necessary to raise or lower the breechblock slightly while removing the shaft. Lower the breechblock sufficiently to remove the extractors.

d. Raise and remove the breechblock from the breech ring. Remove the detent spring (3) (fig. 7) by first removing screw (4) holding spring. The detent (1) may then be removed.

e. The bushing (28) (fig. 6), which is screwed very tightly in the front face of the breechblock, is assembled during manufacture and will not be removed by the using service personnel.

NOTE.—If it is desired to disassemble the closing spring cylinder mechanism, do not insert pin in the spring piston rod. With breech closed unscrew piston rod nut (25) (fig. 6) and withdraw spring piston (24). The closing spring may then be removed from the front and the spring piston rod from the rear.

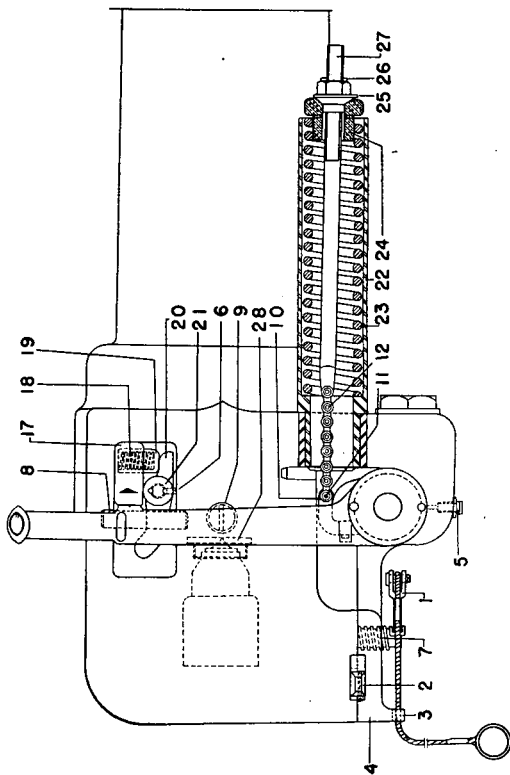


FIGURE 6.—Breech mechanism, 3-inch anti-aircraft gun M3, right side elevation.

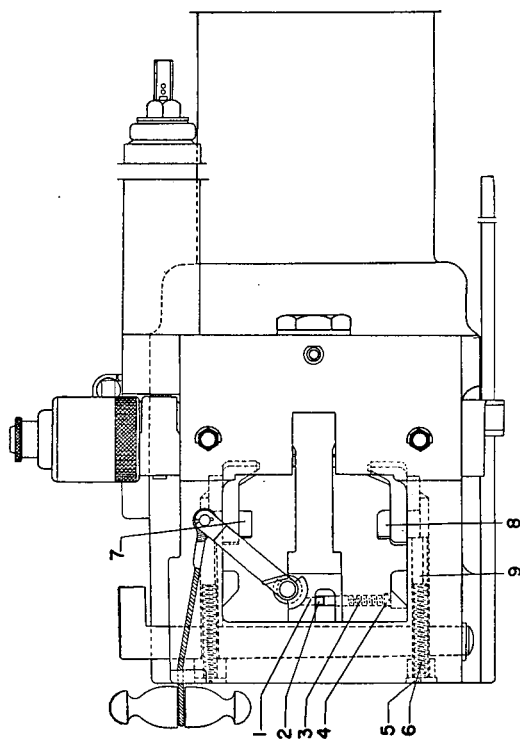


FIGURE 7.—Breech mechanism, 3-inch antiaircraft gun M3, bottom elevation.

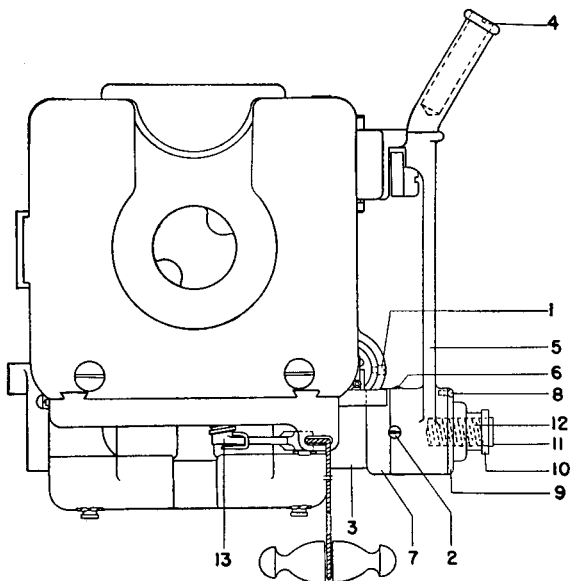


FIGURE 8.—Breech mechanism, 3-inch anti-aircraft gun M3, rear elevation.

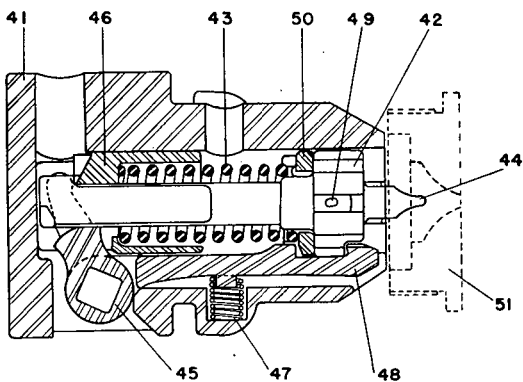


FIGURE 9.—Firing mechanism, 3-inch anti-aircraft gun M3, horizontal cross section.

■ 44. FIRING CASE.—*a.* With the firing case assembly withdrawn from the breechblock as explained in paragraph 43, insert a screw driver in small hole in the firing case and push the trigger fork (45) (fig. 9) from the case.

b. Remove the firing pin holder assembly (42) by pressing the sear (48) against the spring (47) with a finger at the front of the case, and by pushing the entire firing pin holder assembly from the rear with the fingers of the other hand.

c. Remove the sear (48) and the sear spring (47).

■ 45. FIRING PIN HOLDER ASSEMBLY.—*a.* Separate the holder (42) (fig. 9) from the sleeve (46) by pressing inward on the end of the firing pin holder, thus disengaging the irregularly formed end of the firing pin holder from the beveled surface on the inside of the sleeve. The sleeve should then slip off under the action of the spring.

b. Remove the spring by unscrewing the coils from the irregularly formed end of the holder.

c. Remove spring stop (50) and the cotter pin (49) from the holder (42), and unscrew the firing pin (44) from the firing pin holder (42).

■ 46. OPERATING HANDLE AND OPERATING SHAFT.—Unscrew the clutch lock (10) (fig. 8) to disengage the clutch from the shaft, and remove retaining ring lock screw (2). Unscrew the retaining ring (7) from the operating shaft (3) and remove the operating handle assembly. Unscrew retaining ring from the operating handle hub. Remove the clutch lock bearing lock screw (8) and unscrew the bearing from the handle hub. The method of disassembling the remaining parts needs no explanation.

SECTION III

ASSEMBLY OF BREECH AND FIRING MECHANISMS

■ 47. FIRING PIN HOLDER ASSEMBLY.—*a.* Insert the firing pin (44) (fig. 9) into the firing pin holder (42) until it fits tightly against the shoulder. Insert the cotter pin (49) through the holder and spread the ends to clear the firing case bore. Assemble spring stop (50) and firing spring (43) on the firing pin holder (42). Place the firing pin holder sleeve (46) over the firing spring and firing pin holder, and force it against the spring until the beveled surface on the

inner part of the sleeve and the irregularly formed end of the firing pin holder hook together, retaining the parts.

b. Pressing the parts together can be best accomplished in the following manner: grasp the holder in one hand, guiding the sleeve with the other. Then place the rear edge of the sleeve against the sharp edge of a bench or convenient part of the carriage, and push the parts together by leaning the weight of the body against the hand holding the front end of the firing pin holder.

■ 48. **FIRING CASE.**—*a.* Turn the spring stop (50) (fig. 9) on the firing pin holder (42) until the flat edges of the fork are in a plane parallel to that of the flat surface at the forward edge of the firing pin holder. Failure to do this will make it almost impossible for the forward end of the sear (48) to engage the firing pin holder (42) as shown in the diagram of the assembled mechanism.

b. Insert the sear spring (47) into its seat inside the firing case (41). Insert the sear (48) into the case, placing the stud on the bottom of the sear into the sear spring (47). With the finger hold the rear end of the sear (48) up, and with the other hand insert the firing pin holder assembly about halfway into the case. Then press the rear end of the sear down and push the firing pin holder assembly fully into the case.

c. Insert the trigger fork (45) into the opening in the side of the case, with the rounded projections on the fork ends toward the front of the case, in which position the ends rest against the rear face of the firing pin holder sleeve (46). Push the trigger fork in as far as it will go, slapping it with the palm of the hand if necessary.

■ 49. **BREECHBLOCK.**—*a.* Assemble the trigger shaft detent (1) (fig. 7) into the detent hole in the lower left-hand side of the block. As the detent passes into the slot in the bottom of the block, slip the detent handle (2) over the small diameter of the detent up to the shoulder. Place the detent spring (3) in the hole and insert screw (4).

b. Insert the firing case assembly into the breechblock and turn it until the indicating lines or the words "top" on the firing case and breechblock coincide. Do not assemble the trigger shaft until after the breechblock has been assembled to the gun.

■ 50. OPERATING HANDLE.—*a.* The grip position is made hollow to reduce its weight, the hole in the end being closed by screwing in the handle plug (4) (fig. 8). The oil cup (6) is pressed into the hub of the handle. These parts are assembled during manufacture and are not intended to be removed.

b. Screw the clutch lock (10) (fig. 8) through the clutch spring (12) into the clutch (11), and insert them into the handle, locating the key and keyway together. Now screw the bearing fully into the handle. Locate the nearest hole in the bearing directly over the tapped hole in the handle hub, and secure the bearing with the clutch lock bearing lock screw (8).

c. Screw the retaining ring on the hub of the handle until it strikes the shoulder. It must then be unscrewed nearly one full turn (lacking about one-half inch measured on the circumference) in order to locate the ring so that the handle will slide on the operating shaft without interference.

■ 51. OPERATING SHAFT.—Slide the operating handle assembly on the operating shaft, pushing it on until the projections on the shaft pass through the openings in the retaining ring (7). Retain the handle on the shaft by screwing the retaining ring fully against the shoulder, and insert the retaining ring lock screw (2). The lock screw should seat in the depressions in the ring and handle. Screw the clutch lock fully to the right to engage the clutch with the shaft.

■ 52. BREECH MECHANISM.—*a.* Insert the operating shaft into its bearings and allow it to rest with the operating handle down.

b. Place the extractors (7) and (8) (fig. 7) in position in the breech recess, and press upward from the bottom so that they lie flat against the face of the breech.

c. Grip the eyebolt screwed in the top of the breechblock and lower the block about halfway into the breech recess.

d. Slowly raise the operating handle, at the same time lowering the breechblock, working the arm of the operating shaft into the T-slot in the breechblock during the operation. It will be necessary to withdraw partially the operating shaft from its bearing seat while engaging the arm of the operating shaft into its position in the T-slot. Then close the breech.

e. Slide the lock plate into its seat in the bottom face of the breech ring and secure it by driving in the lock plate key. Insert the cotter pin in the key.

f. With the breech open, insert the extractor plungers (9) (fig. 7) in the holes in the breech face, small end of the plunger to the rear, followed by the extractor plunger springs. Screw plugs (5) in position.

g. Attach the chain terminal to the operating shaft. (In case the closing spring assembly has been disassembled, place the closing springs (23) (fig. 6) in the closing spring cylinder (22). Insert the spring piston rod (27) through the spring and spring cylinder from the rear end and attach the chain terminal to the operating shaft. Place the spring piston (24) on the rod and screw the piston rod nut (25) on the rod until the end protrudes through the nut about $\frac{3}{4}$ inch.)

h. Close the breech and insert the trigger shaft (1) (fig. 6), first placing the spring (7) in position on the trigger shaft. Press the trigger shaft detent handle to the left to allow the trigger shaft to enter, and then allow the detent (1) (fig. 7) to move back into the annular groove in the shaft.

■ 53. LATCH PLATE (fig. 6).—Place the latch spring (18) into the spring cup (19), and hold the parts in position in latch plate (17). At the same time assemble the latch (20) in the plate by forcing the boss on the latch into its seat in the latch plate, holding it in position until the latch bolt (21) can be entered several threads. Screw the latch bolt (21) home and insert the latch bolt set screw (6).

SECTION IV

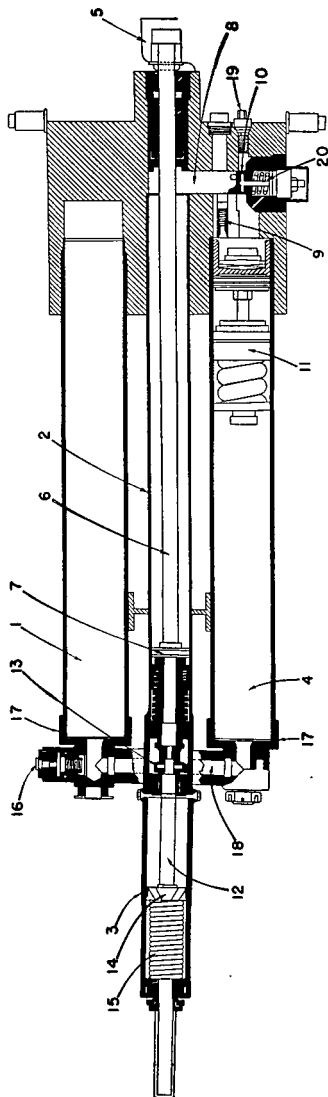
CHECK AND REPLACEMENT OF OIL AND GAS IN RECUPERATOR AND EQUILIBRATORS

■ 54. GENERAL.—The personnel of the using service will check and reestablish the oil reserve in the recoil system. The purpose of the oil reserve is to move the floating piston from its seat and suspend it between the gas and the oil in the cylinder. An oil reserve must at all times be maintained; otherwise damage to the system will occur if the gun is fired. Leakage of a few drops of oil from the system will not hinder its operation.

■ 55. TO CHECK AND ESTABLISH OIL RESERVE.—*a. Check of oil reserve.*—With the gun in a horizontal position remove the oil filling plug (19) (fig. 10) at the lower left rear of the cradle. Insert the oil release tool and screw it in until the oil filling valve is unseated. If any reserve oil is in the system, it will be forced out through the oil release by the action of the gas on the floating piston. (If the escaping oil has an emulsified appearance, notify the ordnance maintenance company.) If no oil flows through the oil release, there is insufficient gas pressure in the system, a void in the oil side of the system, or both.

b. Establishment of an oil reserve when oil flows.—When a flow of oil is obtained from the test made in *a* above, the oil is allowed to run out through the oil release tool until it ceases to flow or the stream drops at right angles to the flow. This eliminates all of the old reserve, preventing the building up of an excessive reserve. The proper oil reserve is then established by injecting the contents of an oil screw filler full of oil *twice*, as explained in paragraphs 56 and 57.

c. Establishment of an oil reserve when oil does not flow.—When no flow of oil is obtained from the test made in *a* above, have the gas pressure checked. If there is sufficient gas pressure, the lack of reserve oil must be caused by a void in the oil side of the system. Manipulate the elevating and leveling mechanisms to obtain a definite depression of the gun muzzle as indicated by a spirit level placed on the top surface of the breech ring. With the gun thus depressed, purge the reserve oil by inserting the oil release tool as described in *a* above, and then withdraw the release tool to permit the oil valve to close. Remove the plug from the oil filling hole located on the left side of the cradle (visible through a small hole in the top carriage), and pour in the prescribed recoil oil through a funnel until the cylinder is completely full. Replace the plug, leaving it about two turns short of hard home. Prepare and attach a filled oil screw filler to the system and slowly charge reserve oil into the mechanism. As soon as bubble-free oil starts to emerge from around the lightly screwed-in plug, firmly seat the plug. The proper oil reserve is then established by injecting the contents of an oil screw filler full of oil *twice*, as explained in paragraphs 56 and 57.



- | | | |
|-----------------------------------|--|----------------------------------|
| 1. Gas reservoir cylinder. | 8. Oil passageway. | 14. Counterrecoil buffer piston. |
| 2. Recoil cylinder. | 9. Counterrecoil valve. | 15. Countercoil buffer spring. |
| 3. Counterrecoil buffer cylinder. | 10. Recoil valve. | 16. Gas filling plug. |
| 4. Floating piston cylinder. | 11. Floating piston. | 17. Cylinder head. |
| 5. Breech ring. | 12. Counterrecoil buffer piston rod. | 18. Bypass connection. |
| 6. Recoil piston rod. | 13. Guide for counterrecoil buffer piston rod. | 19. Oil filling valve and plug. |
| 7. Recoil piston. | | 20. Recoil valve spring. |

FIGURE 10.—Recoil system, 3-inch anti-aircraft mount M2A1 (top elevation).

NOTE.—The expedient of charging more than two oil screw fillerfulls of reserve oil into a filled recoil mechanism to obtain increases in the gas pressure is definitely prohibited. Failure to observe this restriction may result in serious damage to the recoil mechanism during firing.

■ 56. TO INJECT OIL WITH OIL SCREW FILLER.—*a.* Withdraw the piston of the oil screw filler and fill the body of the filler with recoil oil, preventing the loss of oil by holding a finger over the end of the tube. Replace piston and cap. Hold the filler with pipe up and turn the screw until a small amount of oil flows from it. This will expel the air from the filler.

b. Place the oil screw filler in the bracket provided at the rear left side of the cradle. Connect the tube of the filler to the oil filling inlet. Turn the handle of the oil screw filler, forcing the oil into the cylinder. When the handle has been completely turned down, refill the oil screw filler without detaching it from the oil filling inlet, and repeat the operation. Then replace the oil filling plug. In case there is leakage of oil around the piston rod stuffing box, adjustment should be made by ordnance personnel.

■ 57. TO FILL BUFFER.—Set the gun at 0° elevation. Remove the oil filling plug at the top of the buffer and fill to overflowing with the prescribed recoil oil. Replace plug.

■ 58. TO CHECK GAS PRESSURE IN RECUPERATOR.—After establishing an oil reserve as explained above, the gas pressure is checked by means of the jacking device on the cradle just above the trunnion on the right side of the piece. With the gun still in a horizontal position, force the gun out of battery about 1 inch with the jacking device, using the wrench provided. Upon release of the jack, the gun should follow back into battery. Now elevate the gun to maximum elevation (normally 1,420 to 1,430 mils) and repeat the jacking operation. If the gun does not return to battery when the jack has been released, depress slowly and note the angle at which the gun does return to battery. If this angle is below 900 mils, the gas supply must be replenished.

■ 59. TO CHARGE RECUPERATOR WITH GAS.—Although the recuperator is normally recharged by ordnance personnel, the operation may be performed by the using personnel if necessary. The procedure is as follows: Remove the closing plug (16) (fig. 10) over the gas filling valve in the gas bypass at the front of the recuperator and attach the gas filling device with gage attached. Remove the cap (fig. 11) below the gage and attach the filling tube which is also connected to a gas bottle. Close the release valve and turn the handle of the

plunger until the lifting of the closing valve from its seat can be felt. Then open the gas bottle valve a small amount, allowing the gas to flow into the recuperator very slowly. Close the gas bottle valve when the pressure on the gage registers approximately 1,100 pounds per square inch. After the desired pressure has been reached, turn the plunger handle and allow the valve to seat. Disconnect the tube from the gas filling device and replace the cap. Again turn the plunger handle to open the valve and observe the pressure on the gage. If the pressure is above 1,080 pounds per square inch in the recuperator, open the release valve and allow a slow escape of the gas until the proper pressure is indicated, then seat the valve by turning the plunger handle. Remove the filling device and replace the closing plug.

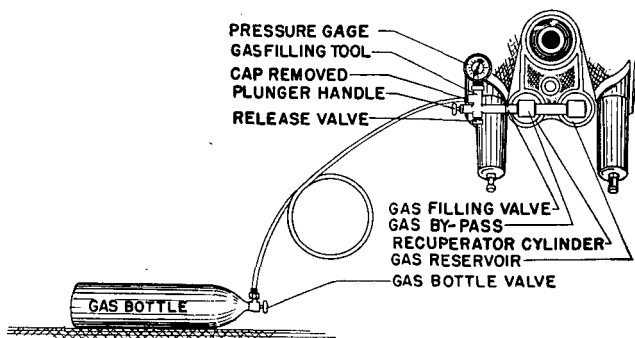


FIGURE 11.—Method of replenishing gas in recuperator cylinder.

■ 60. To CHARGE EQUILIBRATORS WITH GAS.—This operation is normally performed by ordnance personnel but if necessary may be done by the using personnel. The procedure is as follows:

a. Place the gun at approximately 20° elevation and adjust both volume control indices to 90 on their respective scales. Remove the closing plug over the valve at the lower end of one of the equilibrators and attach the gas filling device with gage attached. The method of manipulation of valves is the same as described for charging the recuperator. The gas bottle valve is closed when the pressure on the gage registers 600 pounds. Turn the plunger handle and allow the gas filling valve to close on its seat. Detach the filling equip-

ment, replace the filling valve plug, and attach the filling equipment to the second equilibrator.

b. A moderate effort for elevating the gun should be applied on the elevating handwheels while the second equilibrator is being slowly charged. As soon as the handwheels start to turn, the flow of gas should be stopped and the elevating and depressing efforts at the handwheels should be observed for equal balance. The gas pressure should be adjusted by manipulating the filling and release valves of the charging apparatus until approximately equal handwheel efforts are obtained at that angle of elevation.

c. If a pressure of over 600 pounds is required in the second equilibrator to obtain balanced handwheel loads at 20° elevation of gun, it indicates that either the first equilibrator has leaked since filling or an abnormal condition exists in the balancing of the tipping parts which should be investigated rather than arbitrarily increasing the equilibrator pressure.

d. When balanced handwheel loads have been obtained, the gas filling tube should be detached from the gas filling valve and the plug reassembled firmly on the gasket.

■ 61. **TO ADJUST EQUILIBRATORS FOR MINOR VARIATIONS IN PRESSURE.**—To compensate for changes in pressure due to temperature variations or minor leaks, the equilibrators may be adjusted by turning the squared shaft at the top of the volume control which connects the middle of each equilibrator to the top carriage. This shaft should be turned until the gun may be elevated or depressed easily at all angles of elevation. However, the pressures should be replenished in the equilibrators when an adjustment of the volume control to the 40 graduation has failed to provide the desired handwheel loads. (Due to variations in top-carriage construction, an adjustment to the 30 graduation on some mounts will result in the contact of the equilibrator case and the top carriage when the gun is at 80° elevation and may seriously damage the equilibrators.)

SECTION V

INSTALLATION OF CHAIN CONNECTING FLOATS OF JACKS

■ 62. **GENERAL.**—a. The purpose of the chain connecting the floats of the two jacks is to keep the inner and outer screws

of each jack in their proper relation when operating. If this chain becomes broken, a new chain must be installed. Before this is done, however, the proper relation between the inner and outer screws of each jack must be obtained. Operate the fast motion jack mechanism handwheel or the ratchet wrench to extend the threaded portion of the outer screw of each jack below the lower machined surface of the pedestal a distance of $5\frac{1}{4}$ inches. The threaded portion of the inner screw is then adjusted to extend below the lower face of the outer screw a distance of 6 inches. The two floats thus set now can be connected with the chain.

b. In installing a new chain, sufficient slack will be provided so that the float of one jack can be raised about 10 inches higher than the float of the other, and so that, with both floats at the same level, the float of one jack cannot be revolved more than one-quarter of a turn without bringing the chain taut.

SECTION VI

LUBRICATION

■ 63. GENERAL.—a. The life of the gun and mount depends to a great extent on proper lubrication. Particular attention will be given to sliding and bearing surfaces, such as the sliding surfaces of the gun and cradle, roller bearings, ball bearings, elevating rack, traversing rack, and breech mechanism.

b. Industrial type grease fittings and oil plugs are provided on the gun and mount. The fittings are painted red and the oil holes are marked by a red ring.

c. Care must be taken when cleaning gear cases or sliding surfaces to insure the complete removal of all residue or sediment. Dirt or other foreign matter should not be allowed to drop into any of the gear cases.

d. Battery personnel, when cleaning the gun, are cautioned to refrain from using water from a high-pressure hose since this will result in water entering the bearings, causing corrosion and nonfunction of the operating parts.

e. Lubrication frequencies are based on continuous use of the matériel with frequent firing.

f. No lubricants other than those prescribed will be used without the authority of the Ordnance Department.

g. Every 5,000 miles or 6 months, remove wheels, clean and

repack bearings, and wipe off excessive grease. Do not fill hub caps with grease. It is important that the bearings be properly adjusted when replaced. Failure will result if the bearings are adjusted too tightly.

h. Oil and grease should be applied while the parts are being maneuvered to insure distribution of the lubricant to all moving parts.

i. The teeth of the elevating rack and traversing gear will be cleaned with dry-cleaning solvent before new grease is applied.

j. For storage or shipment of this matériel, follow the instructions in TM 9-850.

■ 64. INSTRUCTIONS.—Because of the different climates in which this matériel may be expected to operate, special instructions are necessary for three regions: arctic, temperate, and tropical. By arctic is meant a climate usually experienced in Alaska, Newfoundland, Labrador, Iceland, etc. By temperate is meant a climate usually experienced in continental United States, Hawaii, etc., and by tropical is meant that usually experienced in Panama, the Philippines, and Cuba. In certain cases the prescribed instructions may not apply; for example, a tropical climate may be experienced in temperate regions. In cases of this nature the instructions as to the classification of climate in which the matériel is operating is left to the judgment of the ordnance officer. The matériel will be lubricated for different climatic conditions as follows:

a. Manufacturing arsenals and plants will lubricate the matériel on assembly with lubricants prescribed for the temperate climate.

b. Matériel previously lubricated for the arctic climates and which is to be used in temperate or tropical regions will be relubricated with lubricants prescribed for its use in these regions.

c. Matériel previously lubricated for a tropic climate and which is to be used in temperate or arctic regions will be completely cleaned of all lubricants and relubricated with the lubricants prescribed for its use in these regions.

■ 65. LUBRICATION CHART.—The following chart gives the type and location of lubricator and lubricant and the frequency and method of application for the various lubricating points on the gun and mount:

LUBRICATION CHART

Group	Part lubricated	Method of oiling	Lubricant ¹	Frequency
Breech mechanism.	All moving parts.	Fitting and oiler.	Grease.	Daily when in use and after firing.
	Surfaces.	Brush.	Lubricating oil.	
Cradle.	Cradle liner and gun guide—5 places.	Fitting.	Grease.	End of each day's firing.
Top carriage.	Ball thrust bearing.	Oil pipe in top carriage—2 places.	Grease.	Weekly.
	Spherical roller bearing, lower end of top carriage.	Fitting, lower end.	Grease.	Weekly.
Equilibrator.	Bearings on plunger head—2 places.	Fitting.	Grease.	Weekly.
	Trunnion ball bearings—4 places.	Remove covers and pack with grease.	Grease.	Weekly.
	Volume control (temperature adjustment) worm shaft.	Drop oil on shaft and allow to run into bearing.	Lubricating oil.	Weekly.
	Plunger.	Clean and grease.	Grease.	Weekly.
Traversing mechanism.	Worm, worm gear, ball bearing—1 place.	Remove pipe plug on top of case and pour in oil until it runs out at height plug on side.	Lubricating oil.	Monthly.
	Instrument drive shaft and pinion.	Fitting.	Grease.	Weekly.

¹ See paragraph 66 for grade of lubricant to be used.

LUBRICATION CHART—Continued

Group	Part lubricated	Method of oiling	Lubricant	Frequency
Elevating mechanism.	Worm, worm wheel, and ball bearing.	Remove plug and fill with oil until it flows out of overflow hole in side of case.	Lubricating oil.	Monthly.
	Rack.	Clean and apply grease with brush.	Grease.	Weekly.
	Bearing (near handwheel).	Fitting.	Grease.	Weekly.
Elevation indicator.	Bearings for shaft to indicator—2 places.	Oiler.	Lubricating oil.	Weekly.
Trunnion assembly.	Trunnion bearings.	Remove covers and pack with grease.	Grease.	Weekly.
Bogie, front (towing).	Pins, tie rod—4 places.	Fitting.	Grease.	Weekly or every 250 miles.
	End, drawbar.	Fitting.	Grease.	Weekly.
	Springs and shackles—6 places.	Fitting.	Grease.	Weekly or every 250 miles.
	Joint, steering rod, inner—2 places.	Fitting.	Grease.	Weekly.
	Joint, steering rod, outer—2 places.	Fitting.	Grease.	Weekly.
	Knuckle, steering—4 places.	Fitting.	Grease.	Weekly.
	Screws, clamp—4 places.	Clean and apply grease with brush.	Grease.	Weekly.
	Wheels—bearings.	Hand pack.	Wheel-bearing grease.	Every 5,000 miles or every 6 months.

Bogie, rear.	Springs and shackles—6 places.	Fitting.	Grease.	Weekly or every 250 miles.
	Screws, clamp—4 places.	Clean and apply grease with brush.	Grease.	Weekly.
	Wheels—bearings.	Hand pack.	Grease.	Every 5,000 miles or every 6 months.
	Bearing, brake shaft, outer, left wheel—2 places. Pintle—1 place.	Pipe plugs. Fitting.	Lubricating oil. Grease.	Weekly or every 250 miles.
	Bearing, brake shaft, inner—2 places.	Oiler. Fitting.	Lubricating oil. Grease.	Weekly or every 250 miles. Weekly.
Leveling mechanism.	Leveling screw thrust bearings—2 places.	Fitting.	Grease.	Weekly.
	Screws, leveling—2 places. Leveling bearing, lower.	Apply grease with brush. Fitting; fill until grease oozes out.	Grease. Grease.	Weekly. Weekly.
	Sliding surface of guide, base plate, and housing.	Apply grease with brush.	Grease.	Weekly.
	Screw—1 place. Pinion—2 places.	Fitting. Fitting.	Grease. Grease.	Weekly. Weekly.
Jacks.				

LUBRICATION CHART—Continued

Group	Part lubricated	Method of oiling	Lubricant	Frequency
Outriggers.	Screws, clamp—3 places each outrigger.	Clean and apply grease with grease gun.	Grease.	Weekly.
Traveling lock.	Stud—2 places.	Oiler.	Lubricating oil.	Weekly.
Platform.	Latch and latch bolt. Sliding lock.	Oiler. Brush.	Lubricating oil. Grease.	Weekly. Weekly.
Fuze setter.	Hinge between body and case. Handle setting. Rings, adjusting and setting.	Oiler. Drop oil through two small holes provided. Clean and grease (with special low temperature grease) the surfaces, except the pawls and their guides, which are lubricated with the lubricating oil.	Light machine oil Lubricating oil. Grease and light lubricating oil.	Weekly. Weekly. Daily when in use.
Breech mechanism.	Opening mechanism.	Oiler. Flush working surface while operating mechanism by hand.	Lubricating oil.	Before each day's firing.

■ 66. PRESCRIBED LUBRICANTS.—The following chart shows the prescribed lubricant to be used in the lubrication of 3-inch anti-aircraft gun matériel when operating in arctic, temperate, or tropical climates:

Lubricant	Kind of lubricant used in—		
	Arctic climate	Temperate climate	Tropical climate
Grease.....	Grease, O. D. No. 00.	Grease O. D. No. 0.	Grease O. D. No. 1.
Lubricating oil.	Oil, lubricating, for aircraft instruments and machine guns. (U. S. A. 2-27 of the latest issue in effect.)	Oil, engine, SAE 10. W.	Oil, engine, SAE 30.
Light machine oil.	Oil, lubricating, for aircraft instruments and machine guns. (U. S. A. 2-27 of the latest issue in effect.)	Oil, lubricating, for aircraft instruments and machine guns. (U. S. A. 2-27 of the latest issue in effect.)	Oil, lubricating, for aircraft instruments and machine guns. (U. S. A. 2-27 of the latest issue in effect.)
Wheel-bearing grease.	Grease, wheel-bearing, No. 2.	Grease, wheel-bearing, No. 2.	Grease, wheel-bearing, No. 2.

CHAPTER 9

3-INCH ANTIAIRCRAFT GUNS ON FIXED MOUNTS

Paragraphs

SECTION I. 3-inch antiaircraft gun M1917 on pedestal mount	
M1917-----	67-72
II. 3-inch antiaircraft gun M4 on pedestal mount----	73-75

SECTION I

3-INCH ANTIAIRCRAFT GUN M1917 ON PEDESTAL MOUNT M1917

■ 67. TO DISASSEMBLE BREECH MECHANISM.—*a.* The trigger shaft detent pin is removed, followed by the trigger shaft. The *clutch* is screwed in and the breechblock opened by the operating handle. The plunger plugs are then removed, followed by the extractor plungers and their springs. The lock plate key is taken out. A small clip similar to a pair of tweezers, held together by a bolt and nut, is placed over the spring piston rod just forward of its connection with the chain. The nut is screwed up so that it will clamp the clip tightly to the rod. The extractors are then tripped with an empty cartridge case put in rim first, and the breechblock is allowed to close slowly, the speed being regulated by the man operating the handle. As soon as the clip comes against the face of the cradle, the pull of the closing spring ceases and the block is closed by the operating handle. Consequently, the chain terminal is freed from its lug on the operating lever. The chain is then twisted upward and forward out of the way. The locking plate is next removed by pulling to the rear.

b. An eyebolt is screwed in the top of the breechblock and a rope attached thereto. The lock screw for retaining ring (fig. 12) is removed, and the retaining ring turned clockwise (forward) until the operating handle is free to be pulled off the operating lever. After the handle is removed, the breechblock is raised. Meanwhile, another man takes a firm hold on both ends of the operating lever and, as the breechblock rises, pushes the operating lever as far to the rear as the breechblock will allow, thereby disengaging the T-shaped cam from its groove in the breechblock. The breechblock is pulled up as far as it will go and the operating lever removed

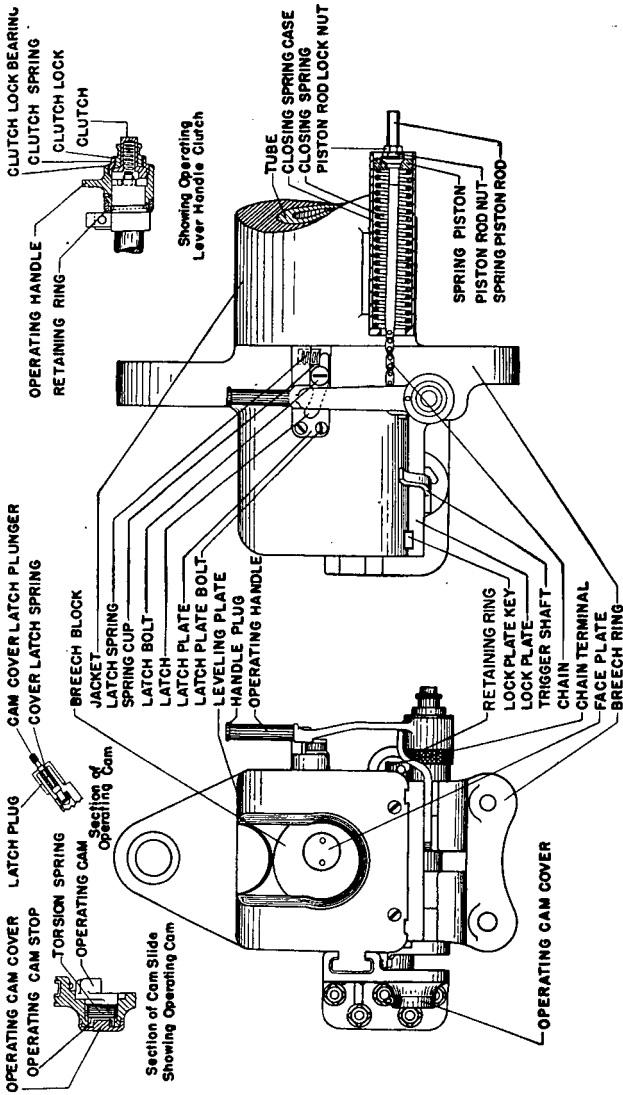


FIGURE 12.—Breech mechanism assembly, 3-inch anti-aircraft gun, M1917.

from its seat. With two men to catch it as it drops clear, the breechblock is lowered completely out of the breech recess.

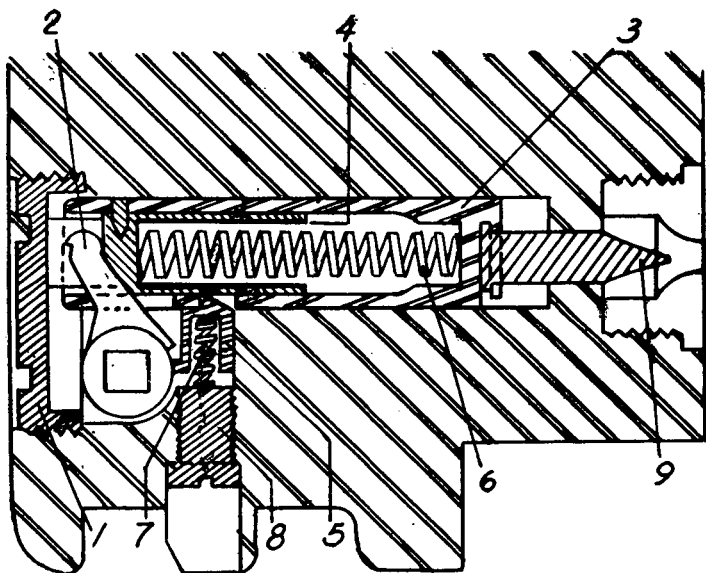
c. To remove the operating cam, the cam cover latch plunger is pulled up and the operating cam cover is turned counter-clockwise (forward and downward) until the cover latch plunger rests in a notch provided for it. The plunger will then be pointed forward and downward. With the plunger pulled out, the cam cover may be taken off by pulling straight away from its seat. By pushing on the end of the operating cam, now exposed, it may be pushed from its seat, the torsion spring with it. It will be necessary to twist the cam with the fingers into a position somewhat similar to that for hand operation before it can be pushed all the way out, due to the small amount of clearance between the gun and the cam slides.

■ 68. TO ASSEMBLE BREECH MECHANISM.—a. It is assumed that the clip is on the spring piston rod and an eyebolt on the breechblock as described above. The extractors are first covered with light oil and placed in position, with their outer lugs resting in the grooves cut for them in the jacket. The lugs being as far forward as possible, the oil causes the extractors to cling to the sides of the recess and prevents their falling out. The breechblock then should be placed directly under its proper position and lifted until the inner extractor lugs have entered their grooves in the breechblock. The breechblock should be pulled up until the inner extractor lugs are seated on their seats in the breechblock; the extractors are tripped by hand and the breechblock is pulled up to its highest position; the operating lever then is placed in its seat. The block is slowly dropped and, without removing the operating lever from its seat, the T-shaped cam on the lever is inserted in the slot on the breechblock, after which the breechblock is allowed to drop to its lowest position. To insert the operating cam, the torsion spring is placed over the cam and the spring twisted sufficiently to permit the eye in the end of the spring to enter the recess of the operating cam seat provided for it. The breechblock should be closed and the lock plate removed for this operation. The operating cam can then be inserted. Care must be taken that this cam is all the way in its seat. The operating cam cover is replaced by reversing the operations described for removing it. It is twisted clockwise to the position desired for auto-

matic or hand operation. The operating cam is then ready for use. *Under no circumstances should the operating cam cover be left in the position for assembling or dismounting.* The lock plate is pushed into place and the lock plate key inserted. The operating handle should be put on the end of the operating lever and the retaining ring screwed up against the operating handle. The lock screw for retaining ring should be put in and the clutch screwed in. The chain should then be brought down into position and the breechblock slowly opened, so that the chain terminal will catch on the lug on the operating lever. The breechblock should then be pulled completely open, care being taken that the extractors seat. If they do not seat they should be pulled to the rear at the top by hand until they do. The tension of the closing spring is now off the clip and the clip can be removed; also the eyebolt can be removed from the breechblock. The extractor plungers and springs and the plunger plugs are then put in place. *It is advisable not to stand directly in rear of these plugs when putting them in or taking them out, as the plunger springs are likely to throw them to the rear with considerable force.*

b. The clutch should then be screwed out and the operating handle placed in a vertical position. The trigger shaft is inserted and held in position by the trigger shaft detent. The breech mechanism is then ready for use.

■ 69. TO DISASSEMBLE FIRING MECHANISM.—With the trigger shaft removed, unscrew the faceplate (1) (fig. 13) on the breechblock and draw out the firing pin holder assembly. If the ramp on the front of the sear (5) does not release the holder so that it may be pulled out with the fingers, insert a small screw driver between the trigger arm (2) and the firing spring shoe (4) and draw to the rear. Remove the sear (5) and sear spring (7), drawing them into the firing pin hole. Separate the parts of the firing pin holder assembly by inserting the flat end of the trigger shaft in the slot of the firing spring shoe and pushing it down, turning the shoe to the left, or counterclockwise, to disengage the lug on the shoe from the slot in the firing pin holder (3); then allow the firing spring to push the shoe out.



- | | |
|------------------------|----------------------|
| 1. Faceplate. | 6. Firing spring. |
| 2. Trigger arm. | 7. Sear spring. |
| 3. Firing pin holder. | 8. Sear spring seat. |
| 4. Firing spring shoe. | 9. Firing pin point. |
| 5. Sear. | |

FIGURE 13.—Continuous-pull firing mechanism (horizontal cross section), old type, used on 3-inch antiaircraft gun M1917.

■ 70. TO ASSEMBLE FIRING PIN ASSEMBLY.—*a.* Assemble the firing spring (6) (fig. 13) into the firing pin holder (3) followed by the firing spring shoe (4). Compress the spring by using the flat end of the trigger shaft, placing it in the slot in the firing spring shoe to force the shoe into the holder, and by guiding the projection on the shoe so that it enters the slot in the holder. Turn the shoe to the right or clockwise so that the shoe is locked in the holder. Insert the trigger arm (2) through the opening in the side of the shoe so that the rounded knob portion will bear against the shoe. Slide the firing pin (9) into its seat in the front end of the holder.

b. Insert the sear (5), containing the sear spring, into its seat in the block with the ramp or bevel of its inner end toward the muzzle. In doing this, the sear may be suspended on the end of a small screw driver forced between the coils of the spring. With the small screw driver force the sear outward and insert the firing pin assembly (without the trigger arm) until the front end of the holder holds the sear in place; then take out the screw driver and push the firing pin assembly home, replacing and guiding the trigger arm into its seat in the block. Retain the parts in position by screwing in the faceplate. Put the trigger shaft in and prove the correctness of the assembly by pulling the lanyard several times and observing its functioning.

■ 71. TO DRAIN AND REFILL RECOIL CYLINDERS.—a. To drain the recoil cylinders, remove the filling and drain plugs and let the oil drain out. With the gun in a horizontal position and the drain plugs replaced tightly, fill the recoil cylinders with the prescribed recoil oil through the filling hole. Leave a void of not in excess of one-fourth of a pint of oil in the cylinder to allow for expansion of the oil as it becomes heated during firing. The recoil cylinders should be emptied and refilled at least once every 3 months, and should be thoroughly cleaned by ordnance personnel as often as conditions warrant. Once every 6 months is suggested as a minimum.

b. The following table shows the amount and kind of recoil oil to be used for guns on fixed mounts when used under different climatic conditions:

RECOIL OIL FOR FIXED GUN MOUNTS

3-inch antiaircraft gun carriage	When temperature averages above 40° F.	When temperature averages 40° F. or below	Recoil mechanism capacity (pints)
M3	Light, U. S. Army Specification 2-36.	Light, Specification RIXS-189.	16
M1917	do	do	6½
M1917MI	do	do	16
M1917MII	do	do	6½
M3A1	do	do	16

■ 72. LUBRICATION.—A regular schedule of lubrication should be maintained. All sliding contact surfaces should be kept clean and well lubricated, and proper precautions taken to prevent rust. Oil holes and grease fittings are provided for lubricating the various mechanisms.

SECTION II

3-INCH ANTIAIRCRAFT GUN M4 ON PEDESTAL MOUNT

■ 73. TO ASSEMBLE AND DISASSEMBLE BREECH MECHANISM.—

The breech mechanism of this gun is very similar to that of the M3 gun on mobile mount, and the instructions relative to assembly and disassembly of the breech mechanism of the M3 gun may, in general, be followed by personnel manning the M4 gun. (See pars. 43 to 53, incl.)

■ 74. TO DRAIN AND REFILL RECOIL CYLINDERS.—For instructions in filling and draining the recoil cylinders, see paragraph 71.

■ 75. LUBRICATION.—A regular schedule of lubrication should be maintained. All sliding contact surfaces should be kept clean and well lubricated, and proper precautions taken to prevent rust. Oil holes and grease fittings are provided for lubricating the various mechanisms. (See pars. 29 to 34, incl.)

CHAPTER 10

M8 FUZE SETTER

	Paragraphs
SECTION I. General.....	76-78
II. Adjustments.....	79-81
III. Care and preservation.....	82

SECTION I

GENERAL

■ 76. DESCRIPTION.—*a.* The fuze setter consists principally of the fuze indicator, the adjusting mechanism, and the setting mechanism. The indicator and adjusting mechanism are inclosed within the case (fig. 15) while the setting mechanism is housed within the body.

b. (1) The fuze indicator includes a fuze range scale, a mechanical (outer) index, an electrical (inner) index, and a standard a-c synchronous electrical unit.

(2) The electrical unit positions the electrical index at the position on the fuze range scale corresponding to the fuze setting transmitted from the director.

c. The adjusting mechanism is that mechanism which causes the fuze to be set at the particular fuze setting desired. A handwheel (fig. 14) is geared both to the mechanical index and to an adjusting ring (fig. 15) whose function is to engage and hold fast the lug or slot on the setting element of the fuze on the projectile. By turning the handwheel the mechanical index is made to indicate a particular fuze setting, and the adjusting ring is revolved to such a position that its pawls will stop the setting element on the fuze at the same fuze setting that is indicated by the mechanical index.

d. The setting mechanism, driven by the setting crank (fig. 14), contains a setting ring (fig. 15) which engages the lug or slot on the body of the fuze and turns the projectile until the fuze body is properly positioned with respect to the setting element of the fuze.

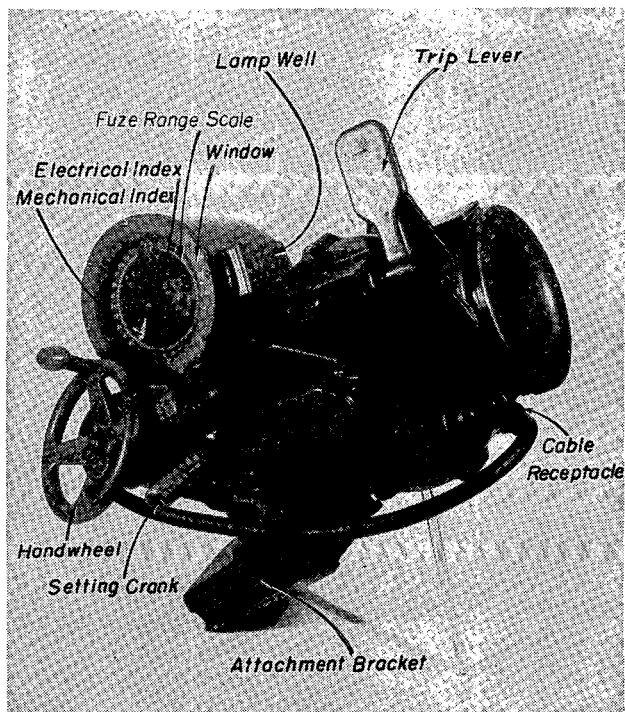


FIGURE 14.—M8 fuze setter.

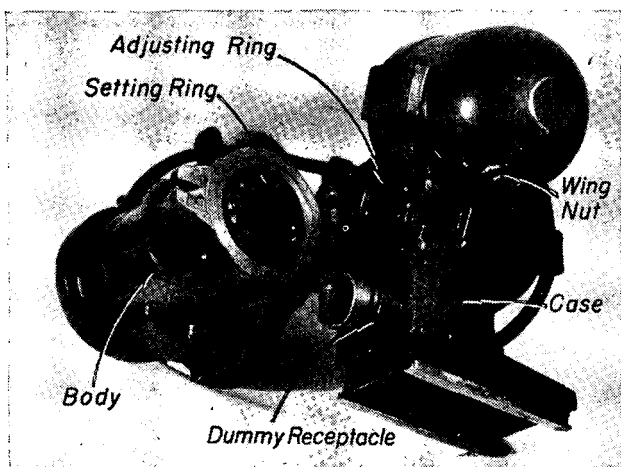


FIGURE 15.—M8 fuze setter open for inspection.

■ 77. OPERATION DURING SETTING OF FUZE.—Briefly, the sequence of events in the setting of a fuze is as follows:

a. One turn of the setting crank causes the setting ring to make two revolutions. During the first revolution pawls on the setting ring arrive at and engage the slot in (or lug on) the body of the fuze and begin to rotate the round.

b. The adjusting ring, meanwhile, has been positioned according to the fuze setting indicated by the director. During the second revolution of the setting ring the lug or slot in the setting element of the fuze will arrive at and be stopped by the pawls on the adjusting ring.

c. The setting ring continues to turn the projectile until the second revolution is completed, when a stop pawl terminates the movement. In this position the body of the fuze has been stopped at what might be called a zero position, while the setting element of the fuze has been stopped at a point the proper number of graduations away from the zero position, and the fuze is said to be "set."

■ 78. ADJUSTING AND SETTING RINGS.—The case and the body are hinged, and by loosening the wing nut holding the two together, it is possible to swing the body away from the case,

giving access to the adjusting and setting rings. Three sets of rings are provided, one for the 21-second powder train fuze, one for the 30-second mechanical fuze, and one for use with dummy cartridges. The rings are easily changed, and the rings of a particular set cannot be assembled improperly because the screw holes in the rings are spaced differently. For the two different time fuzes, different range scales for the face of the fuze indicator are provided.

SECTION II

ADJUSTMENTS

■ 79. TO CHANGE RINGS IN FUZE SETTER.—*a.* Open the fuze setter as shown in figure 15, remove the screws and the lock washers in each ring already assembled in the fuze setter, and remove this set of rings. If the rings stick in place in the fuze setter after the fastening screws have been removed, insert the screws into the tapped holes in the rings and pull the rings loose. Select from the accessory chest the proper set of rings to be used; then assemble the adjusting rings to the adapter in the case or lower portion of the fuze setter, and the setting ring to the socket in the body or upper portion.

b. In case the fuze range scale on the fuze indicator does not correspond to the fuze to be used, the scale must be replaced with the proper one from the accessory chest. Carefully remove the window frame from the indicator face so as not to injure the gasket. Next remove the six screws and the ring which clamps the scale in place. Remove the scale, wrap it in soft tissue paper, and secure it in place behind the block in the lid of the accessory chest. Place the new scale in place, replace the clamping ring, and insert the six retaining screws, leaving the ring just loose enough to allow the scale to be moved. Place a round in the fuze setter, set the fuze, and read the setting on the fuze as closely as possible. Insert a blunt point in the hole in the scale over the zero and slide the scale around under the ring until the value set on the fuze is opposite the indicating marks on the outer or mechanical index. Recheck at another fuze setting, then tighten the clamping ring screws evenly and firmly. Replace the window and its fastening screws.

■ 80. TO SYNCHRONIZE MECHANICAL INDEX WITH FUZE RANGE SCALE ON FACE OF INDICATOR.—If the outer or mechanical index does not indicate on the fuze range scale the fuze setting to which the fuze setter actually sets the fuze, it will be necessary to adjust the fuze range scale as explained in paragraph 79. In this connection, before any changes are made, any calibration corrections which are to be or have been made in fuze range must be taken into consideration. See FM 4-110 for application of calibration corrections.

■ 81. TO SYNCHRONIZE ELECTRICAL INDEX WITH DIRECTOR.—For synchronization of the electrical index with the fuze dial on the director see FM 4-110.

SECTION III

CARE AND PRESERVATION

■ 82. GENERAL.—The following instructions should be carefully observed in the care and preservation of the fuze setter:

a. The adjusting and setting rings should be removed frequently from the fuze setter, cleaned thoroughly, lubricated, and then replaced. These rings should be handled carefully to prevent the bending of the thin metal sides adjacent to the pawls, because any interference with the action of these pawls may cause erroneous fuze settings. In lubricating the rings, the surfaces except the pawls and their guides should be greased with petrolatum (U. S. A. Spec. 2-67) to prevent rust. The pawls and their guides should be oiled with lubricating oil for aircraft instruments and machine guns (U. S. A. Spec. 2-27).

b. The screws which fasten the adjusting and setting rings in place should be kept tight, with the lock washers under the screw heads to prevent the screws from loosening.

c. Rings which are not being used should be kept in the accessory chest.

d. Great care should be exercised in handling the scales and rings, especially when adjusting or changing them, as they are easily deformed or damaged. The alternate fuze range scale should be wrapped in tissue paper and kept in the recess in the block fastened in the lid of the accessory chest.

e. No provision has been made for lubricating in the field any of the internal moving parts, as the entire device should

be torn down and serviced at regular intervals by ordnance maintenance personnel.

f. Care should be exercised, when handling the fuze setter, not to bump any part of the device. The wing nut on the eye-bolt should be tight at all times, especially when the fuze setter is to be picked up. Always grasp the large main castings when handling. The fuze setter should not be laid down; it should be placed in its support on the gun mount or in the traveling bracket.

g. The fuze setter should be kept covered with the canvas cover when it is not in use.

h. Whenever the cable receptacle (fig. 14) is not connected to the gun junction box, it should be stowed on the dummy receptacle with the cable wrapped around in front of the fuze indicator.

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CHAPTER 11

DRILL TABLES

- TABLE I.** Guns equipped with automatic data transmission system and M8 fuze setter.
- II.** Emplacing M3 gun on M2A1 or M2A2 mobile mount.
 - III.** Placing M3 gun on M2A1 or M2A2 mobile mount in traveling position.

TABLE I.—Guns equipped with automatic data transmission system and M8 fuze setter (3-inch AA gun M3 on mobile mounts M2A1 and M2A2 and 3-inch AA gun M4 on fixed mount M3A1)

Details	DETAILS, POSTS	(c) EXAMINE GUN (b) REPORT	TARGET	COMMENCE FIRING	(a) SUSPEND FIRING (b) CEASE FIRING
Gunner.	The gunner procures a wiper of cotton waste and a can of oil; he places the wiper and oil in convenient place, removes the breech cover, assisted by No. 5, disposes of it at the designated place, and takes post to the right rear of the gun opposite and facing the breech.	(a) Assisted by No. 5, he examines, cleans, and oils the breech-block and breech mechanism, tests the firing mechanism, examines the chamber and bore and, if necessary, calls upon Nos. 1, 2, 3, and 5 for assistance in sponging and cleaning the chamber and bore. (b) He reports to the gun commander, "Breach in order," or reports any defects he is unable to remedy without delay.	He opens the breech by bearing down on the operating handle until the breechblock is locked open and immediately raises the operating handle to its vertical position. He assumes a position facing the breech convenient for loading yet clear of the recoil with his feet well braced and the lanyard grasped in his right hand.	As soon as the first round is placed in loading position by No. 5 he rams the cartridge. As soon as the closing breech has knocked his left hand clear he fires the gun by pulling the lanyard with his right hand. He continues ramming and firing without shifting position or releasing the lanyard. In case of misfire he calls, "Misfire," to the gun commander and keeps all cannoneers clear of the breech while the prescribed safety precautions are taken.	(a) If an unfired round is in the gun he unloads it by bearing down on the operating handle as soon as No. 5 is ready to receive the cartridge, and remains at his post. (b) Same as SUSPEND FIRING.

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Fuze range setter (fuze setter).	He takes post seated on the fuze setter's seat, facing the fuze setter.	(a) Assisted by No. 6, he examines, cleans, and oils (where necessary) the fuze setter, fuze range indicator and connections thereto. Assisted by No. 4, he tests the operation by setting and checking a fuze at several values. (b) He reports to the gun commander, "Fuze setter in order," or reports such defects as he is unable to remedy without delay.	He turns the fuze range handwheel so as to match the mechanical pointer with the electrical pointer of the fuze range indicator and thereafter keeps them matched.	He continues to keep his pointers matched.	(a) He continues to keep his pointers matched. (b) He turns his mechanical pointer to "safe" and directs No. 4 to remove the round from the setter. He supervises the setting at "safe" of any other rounds necessary, checking each fuze as it is removed from his setter. Thereafter he remains at his post.
Azimuth setter.	He takes post seated on the left side of the gun, facing the azimuth indicator.	(a) He examines the traversing mechanism and azimuth indicator and connections. (b) He reports to the gun commander, "Traversing in order," or reports any defects he is unable to remedy without delay.	He traverses the gun so as to match the mechanical pointers with the electrical pointers of the indicator and thereafter keeps those pointers matched.	He continues to keep his pointers matched.	(a) He continues to keep his pointers matched. (b) He stops matching his pointers but remains at his post.

TABLE I.—Guns equipped with automatic data transmission system and M8 fuze setter (3-inch AA gun M3 on mobile mounts M2A1 and M2A2 and 3-inch AA gun M4 on fixed mount M3A1)—Continued

Details	DETAILS, POSTS	(a) EXAMINE GUN (b) REPORT	TARGET	COMMENCE FIRING	(a) SUSPEND FIRING (b) CEASE FIRING
Elevation setter.	He takes post seated on the right side of the gun, facing the elevation indicator.	(a) He examines the elevating mechanism and elevation indicator and the connection thereto. Should a difficulty in elevating indicate the need of a temperature adjustment to the equilibrator, he reports that fact to the gun commander at once. (b) He reports to the gun commander, "Elevating in order," or reports any defects he is unable to remedy without delay.	He elevates or depresses the gun so as to match the mechanical pointers with the electrical pointers of the elevation indicator and thereafter keeps those pointers matched.	He continues to keep his pointers matched.	(a) He continues to keep his pointers matched. (b) He stops matching his pointers but remains at his post.
Ammunition handlers, Nos. 1, 2, 3, and 4.	No. 4 removes, then folds up the gun cover, assisted by No. 2, deposits it at the designated place, and takes	(a) No. 4 inserts a round in the fuze setter, when called for by No. 6, for the purpose of testing the fuze set-	No. 4 takes a round from No. 1 and inserts it in the fuze setter, presses down on the base end of the case	No. 4 continues loading the fuze setter as fast as rounds are removed therefrom by No. 5, re-	(a) If no round is in the fuze setter, No. 4 inserts one and stands ready to continue loading the fuze setter.

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post immediately in rear of the fuze setter, facing it, standing on the gunner's platform. No. 1, assisted by No. 3, uncovers the ammunition and takes post on the ground about 3 feet behind No. 4. No. 3 takes post at the stack of ammunition. No. 2 assists No. 4 in removing and folding up the gun cover and takes post to the rear of the gunner, standing on the ground and facing the breech, just clear of the gunner's platform.	ter, and examines the ammunition, assisted by Nos. 1 and 3. Nos. 1 and 3 assist No. 4 in inspecting and arranging the ammunition near the gun. If necessary, they assist the gunner in cleaning and sponging the bore. No. 2 assists the gunner, if necessary, in cleaning and sponging the bore, and examines the emplacement, removing and disposing of any obstructions and covering soft spots on the ground that might interfere with the smooth functioning of Nos. 1, 3, and 4. (b) No. 4 reports to the gun commander, "Ammunition in order," or reports any defects he is unable to remedy without delay.	with his right hand, brings his left hand over and strikes a quick slap against the release lever on top side of fuze setter. After No. 6 has completed one turn of the setting crank No. 4 removes his right hand pressure from the base of the projectile, turns to receive another round from No. 1, and stands ready to load the fuze setter again. No. 1 takes a round from No. 3 and passes it to No. 4. He repeats the operation. No. 3 takes a round from the stack and passes it to No. 1. He repeats the operation. No. 2 has no duties. (For target practice see note 1.)	ceiving the rounds from No. 1. Nos. 1 and 3 continue serving ammunition to No. 4. No. 4. No. 2 clears the empty cases from the emplacement.	Nos. 1 and 3 stand ready to serve ammunition to No. 4. No. 2, if an unfired round remains in the gun, receives it from No. 5, lays it aside, and continues clearing the empty cases from the emplacement.
				(b) Nos. 1, 3, and 4 procure and assist in setting at "safe" such rounds as have been set and remain unfired, return them to the stack, and remain at their posts. No. 2 continues clearing the empty cases from the emplacement. When the emplacement is cleared he remains at his post.

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TABLE I.—Guns equipped with automatic data transmission system and M8 fuze setter (3-inch AA gun M3 on mobile mounts M2A1 and M2A2 and 3-inch AA gun M4 on fixed mount M3A1—Continued

Details	DETAILS, POSTS	(a) EXAMINE GUN (b) REPORT	TARGET	COMMENCE FIRING	(a) SUSPEND FIRING (b) CEASE FIRING
Relay No. 5.	No. 5 procures the chamber and bore sponges and a wiper of cotton waste, disposes of the sponges in the designated place, assists the gunner in removing the breech cover, and takes post about 2 feet to the left and rear of the breech, facing the breech.	(a) He assists the gunner in examining, cleaning, and oiling the breech mechanism, firing mechanism, chamber, and bore of the gun. He is responsible that the breech operating cam plunger is set for automatic or hand operation of the breech as directed by the gun commander. (b) No duties.	No duties.	He removes a round from the fuze setter and holds it in the loading position at the breech. As soon as the round is loaded (by the gunner) he repeats the operation.	(a) If an unfired round is in the gun, he places his right palm behind the breechblock at the signal of the gunner, catches the ejected round and passes it to No. 2, and remains at his post. (b) Same as SUSPEND FIRING.
Fuze setter operator No. 6.	No. 6 removes the muzzle cover and deposits it at the designated place. He takes post standing at the right rear of the fuze range setter, facing the fuze setter.	(a) He assists the fuze range setter in examining, cleaning, and oiling the fuze setting mechanism. Checks to see proper rings are in fuze setter. (b) No duties.	He places his hand on handle so that as soon as the release lever is struck by No. 4, the crank will start. He turns the handle until it comes in contact with the stop, at which time he calls	He continues setting fuzes as quickly as projectiles are inserted in the fuze setter, calling "Cut" as each fuze is set.	(a) He sets the fuze if an unset round is in the fuze setter or if a round is placed in the fuze setter after receipt of the command. (b) He remains at his post prepared to set such fuzes back to

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Ammunition squad, Nos. 7 to 15 inclusive. (See note 2.)	Nos. 7 to 15, inclusive, are posted by the chief of ammunition in such manner as to expedite the supply of ammunition and perform such other duties as may be directed.	"Cut" to signify that the fuze is set and the round can be withdrawn. (For target practice see note 1.)	They continue the supply of ammunition to the gun position.	"safe" as may be necessary.
	(a) Nos. 7 to 15, inclusive, under the direction of the chief of ammunition, remove from the boxes or crates and prepare the necessary ammunition for the contemplated practice or action. If practice or action is imminent, they place an ammunition supply in a stack at the gun emplacement. (b) No duties.	Nos. 7 to 15, inclusive, stand ready to replenish the ammunition supply at the gun position.	(a) After collecting all empty cases and replenishing the ammunition supply at the gun, they remain at their posts unless otherwise directed. (b) Same as SUSPEND FIRING.	

NOTES

1. The service of the piece, as written, prescribes that the continuous fuze setter be loaded at the command TARGET. This is logical for all service firings; however, in target practice it is not desirable that the fuze setter be loaded and the fuze set until the target has reached approximately safe firing conditions. Therefore, for target practice, Nos. 4 and 6 should have no duties at the command TARGET, but the battery commander should give a warning command STAND BY as the safe field is approached, at which time No. 4 loads the fuze setter, No. 6 sets the fuze as prescribed herein, and No. 5 awaits the command COMMENCE FIRING before removing the round from the setter.
2. This table is for the organization of a mobile unit. For semimobile units the numbers of the ammunition squad are from 7 to 12, as three chauffeurs are not included in the organization for this type unit.

TABLE II.—*Emplacing M3 gun on M2A1 mobile mount*

Details	PREPARE FOR ACTION	JACKS DOWN	JACKS HALT	JACKS UP
Gunner.	The gunner is in charge of the jack float channel, the front bogie, and the left front outrigger. Assisted by No. 5, he procures the jack float channel, puts it in place, and centers it under the jack floats.	He assists the elevation setter in raising the mount.	He takes post at the drawbar of the front bogie and removes the bogie assisted by the fuze range setter, the azimuth setter, elevation setter, and Nos. 3 and 4. Assisted by the fuze range setter and Nos. 3 and 4, he unfolds the front outriggers. He then takes post at the outer section of the left front outrigger and, assisted by No. 4, swings it out to its stop and maneuvers it to assist in the removal of the rear bogie.	Assisted by No. 4, he maneuvers the left front outrigger to maintain the mount level while it is being lowered. When the jack operators are clear, he unlocks the left front section of the platform from the platform rest, and lowers and locks it in its firing position. Assisted by No. 4 he fills dirt under the left front outrigger if necessary.
Fuze range setter.	The fuze range setter is in charge of the right front outrigger, the fuze setter bracket, and the fuze setter.	He takes post at the drawbar of the front bogie.	He assists in removing the front bogie. He assists in unfolding the front outriggers. He then takes post at the outer section of the right front outrigger and, assisted by No. 3, swings it out to its stop and maneuvers it to assist in the removal of the rear bogie.	Assisted by No. 3, he maneuvers the right front outrigger to maintain the mount level while it is being lowered. When the jack operators are clear, he unlocks the right front section of the platform from the platform rest and lowers and locks it in its firing position. Assisted by No. 6, he moves

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the fuze setter bracket from its traveling position, installs it in its firing position, unfolds the fuze setter's seat, and installs the fuze setter on its bracket. Assisted by No. 3, he fills dirt under the right front outrigger if necessary.			He is in charge of the right lifting jack and the azimuth seat. He runs the right lifting jack down by means of the fast motion hand-wheel until the float is in contact with the jack float channel and sets the jack lever ratchet for JACKS DOWN.	Azimuth setter.
He runs the right jack up until the mount is resting on the ground and continues the operation until the jack is fully retracted. He locks the azimuth seat in its firing position and operates one leveling handle as directed by the gun commander.	He unlocks the azimuth seat from its traveling position and swings it out from the mount. He assists in the removal of the front and rear bogies.	Assisted by No. 5 he runs the right jack down by means of the jack lever, raising the mount.		
He runs the left jack up until the mount rests on the ground and continues the operation until the jack is fully retracted. He locks the elevation seat in its firing position and elevates the gun as necessary to free the muzzle from its clamp. He operates one leveling handle as directed by the gun commander.	He unlocks the elevation seat from its traveling position and swings it out from the mount. He assists in the removal of the front and rear bogies.	Assisted by the gunner, he runs the left jack down by means of the jack lever, raising the mount.	He is in charge of the left lifting jack and the elevation seat. He runs the left lifting jack down by means of the fast motion hand-wheel until the float is in contact with the jack float channel (which has been put in place by the gunner and No. 5) and sets the jack lever ratchet for JACKS DOWN.	Elevation setter.

TABLE II.—*Emplacing M3 gun on M2A1 or M2A2 mobile mount—Continued*

Details	PREPARE FOR ACTION	JACKS DOWN	JACKS HALT	JACKS UP
Ammunition handler No. 1.	No duties.	He takes post at the right wheel of the rear bogie.	After the front outriggers have been extended and wedged, No. 1 unlocks the two right-hand clamp screws of the rear bogie and the right rear outrigger clamp screws. He assists in removing the rear bogie. He assists in unfolding the rear outriggers. He inserts the wedges in the right rear outrigger and assists No. 5 in swinging the outrigger to its stop. Uncouples electric brake connections on rear bogie assisted by No. 2.	He assists No. 5 in maneuvering the right rear outrigger while the mount is being lowered to the ground. He assists No. 5 in filling dirt under the right rear outrigger if necessary.
Ammunition handler No. 2.	No duties.	He takes post at the left wheel of the rear bogie.	After the front outriggers have been extended and wedged, No. 2 unlocks the two left-hand clamp screws of the rear bogie and the left rear outrigger clamp screws. He assists in removing the rear bogie. He assists in unfolding the rear outriggers. He inserts	He assists No. 6 in maneuvering the left rear outrigger while the mount is being lowered to the ground. He unlocks the muzzle clamp and directs the elevation setter to elevate the gun. He unlocks the muzzle rest and lays it out on the ground. He then assists No. 6

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in filling dirt under the left rear outrigger if necessary.		the wedges in the left rear outrigger and assists No. 6 in swinging the outrigger to its stop. Assists No. 1 in uncoupling electric brake connections on rear bogie.		Ammunition handler No. 3.
He assists the fuze range setter in maneuvering the right front outrigger while the mount is being lowered to the ground. He then unlocks the platform rest and lays it out on the ground. He assists the fuze range setter in filling dirt under the right front outrigger if necessary.	He assists in removing the front bogie. He assists in unfolding the front outriggers. He inserts the wedges in the right front outrigger and assists the fuze range setter in swinging the outrigger to its stop and maneuvering it.	He takes post at the right wheel of the front bogie.	No. 3 unlocks the two right-hand clamp screws of the front bogie and the right front outrigger clamp screws. Uncouples electric brakes on front bogie assisted by No. 4.	Ammunition handler No. 3.
He assists the gunner in maneuvering the left front outrigger while the mount is being lowered to the ground. He then assists the gunner in filling dirt under the left front outrigger if necessary.	He assists in removing the front bogie. He assists in unfolding the front outriggers. He inserts the wedges in the left front outrigger and assists the gunner in swinging the outrigger to its stop and maneuvering it.	He takes post at the left wheel of the front bogie.	No. 4 unlocks the two left-hand clamp screws of the front bogie and the left front outrigger clamp screws. Assists No. 3 in uncoupling electric brake connections.	Ammunition handler No. 4.

TABLE II.--*Emplacing M3 gun on M2A1 or M2A2 mobile mount*—Continued

Details	PREPARE FOR ACTION	JACKS DOWN	JACKS HALT	JACKS UP
Relayer No. 5.	No. 5 is in charge of the rear bogie and the right rear outrigger. He assists the gunner with the jack float channel.	He assists the azimuth setter in raising the mount.	He takes post at the drawbar of the rear bogie and, after the front bogie is removed and the outriggers extended, re-moves the rear bogie, assisted by the azimuth setter, elevation setter, and Nos. 1, 2, and 6. Assisted by Nos. 1, 2, and 6, he unfolds the rear outriggers. He then takes post at the outer section of the right rear outrigger and, assisted by No. 1, swings it out to its stop.	Assisted by No. 1 he maneuvers the right rear outrigger to maintain the mount level while it is being lowered. When the jack operators are clear, he unlocks the right rear section of the platform from the muzzle rest and lowers and locks it in its firing position. Assisted by No. 1, he fills dirt under the right rear outrigger if necessary.
Fuze setter operator No. 6.	No. 6 is in charge of the left rear outrigger.	He takes post at the drawbar of the rear bogie.	He assists in removing the rear bogie. He assists in unfolding the rear outriggers. He then takes post at the outer section of the left rear outrigger and, assisted by No. 2, swings it out to its stop.	Assisted by No. 2, he maneuvers the left rear outrigger to maintain the mount level while it is being lowered. When the jack operators are clear, he unlocks the left rear section of the platform from the muzzle rest and lowers and locks it in its firing position. He assists the fuze range setter in installing the fuze setter bracket and the fuze setter. Assisted by No. 2,

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Ammunition squad, Nos. 7 to 15, inclusive. (See note 3.)	Nos. 7 to 15, inclusive, under the supervision of the chief of ammunition, unload and prepare ammunition for service and perform such other duties connected with the preparation of the emplacement as may be directed by the gun commander.	As directed.	As directed.	he fills dirt under the left rear outrigger if necessary.
				As directed.

Caution: Care should be exercised that the rear leveling lever is not moved while the gun is secured to the traveling lock, as such movement will damage the elevating mechanism assemblies.

NOTES

1. The end of the mount equipped with the muzzle rest is the rear of the mount. Due to interference of various members of the mount and bogies, it is not allowable to put the mount in traveling position so that the muzzle of the gun points forward when traveling, although the bogies are interchangeable. The bogie equipped with the lunette is the front bogie and will always be placed in position at the front of the mount (breech end of gun).
2. The mount M2A1, unless modified after issue, is equipped with pneumatic type (air) brakes. References to electric brake connections should be changed in this case to read "air hose connections" when applied to rear bogies and eliminated when applied to front bogies.
3. This table is for the organization of a mobile unit. For semimobile units the numbers of the ammunition squad are from 7 to 12, as three chauffeurs are not included in the organization of this type unit.

APPENDIX

LIST OF REFERENCES

Ammunition, coast artillery----	TM 4-205.
Ammunition, general-----	TM 9-1900.
Ammunition, 3-inch antiaircraft gun-----	TM 9-360.
Care and maintenance of matériel-----	TM 9-360 and TM 9-850.
3-inch antiaircraft gun ma- tériel M1918-----	TM 9-360.
Field Manuals -----	FM 4-105, 4-110, 4-120, 4-150, and 4-155.
Safety precautions in firing----	AR 750-10, TM 4-235, and FM 4-120.
Weapons and matériel, coast artillery-----	TM 4-210.



TABLE III.—Placing M3 gun on M2A1 or M2A2 mobile mount in traveling position

Details	MARCH ORDER	JACKS DOWN (1)	JACKS HALT (1)	JACKS DOWN (2)	JACKS HALT (2)	JACKS UP
Gunner.	Assisted by No. 5 he places the breech cover over the breech. Assisted by the fuze range setter and Nos. 3 and 4, he folds the rear sections of the platform and locks them in traveling position.	He assists the elevation setter in maneuvering the left lifting jack.	Assisted by the fuze range setter, and Nos. 3 and 4, he drives the wedges out of the rear outriggers, folds them, and clamps them in traveling position.	He assists the elevation setter in operating the left lifting jack.	He assists the azimuth setter, the fuze range setter, and Nos. 3, 4, and 6 in maneuvering the rear bogie. Takes post at left wheel of front bogie.	He assists the fuze range setter and Nos. 1, 2, 5, and 6 in replacing the front bogie under gun. After the front bogie is replaced, he replaces the jack float channel in traveling position. No. 5 assists in the operation.
Fuze range setter.	Assisted by No. 6, he removes fuze setter and fuze setter bracket, placing them in traveling position. He assists the gunner and Nos. 3 and 4 to fold the rear sections of the platform and to lock them in position.	He takes post by the rear outriggers.	Assists the gunner and Nos. 3 and 4 in driving the wedges out of the rear outriggers and in folding and clamping those outriggers in traveling position.	He takes post at the drawbar of the rear bogie.	He assists the gunner, the azimuth setter, and Nos. 3, 4, and 6 in maneuvering the rear bogie. Takes post at right wheel of front bogie.	He assists the gunner, and Nos. 1, 2, 5, and 6 in replacing the front bogie under gun. With the aid of No. 4 he connects the electric brakes on the rear bogie.
Azimuth setter.	He traverses the gun until it is in position directly over the muzzle rest. He unlocks the azimuth seat from firing position.	Assisted by No. 5, he runs the right lifting jack down, as directed by the gun commander, until the outriggers are broken free of the ground.	No duties.	Assisted by No. 5, he runs the right lifting jack down, as directed by the gun commander, until the rear bogie may be replaced.	Assisted by the gunner, the fuze range setter, and Nos. 3, 4, and 6, replaces the rear bogie and clamps it in position.	He runs the right lifting jack up as directed by the gun commander to permit the gun to settle on the front bogie. After the bogie is locked in position, he runs the lifting jack up fully and locks it. He locks the azimuth seat in traveling position.
Elevation setter.	He depresses the gun as it is traversed by the azimuth setter until the gun is in position to be clamped to the muzzle rest. He unlocks the elevation seat from firing position.	Assisted by the gunner, he runs the left lifting jack down, as directed by the gun commander, until the outriggers are broken free of the ground.	No duties.	Assisted by the gunner, he runs the left lifting jack down, as directed by the gun commander, until the rear bogie may be replaced.	No duties.	He runs the left lifting jack up as directed by the gun commander to permit the gun to settle on the front bogie. After the bogie is locked in position, he runs the lifting jack up fully and locks it. He locks the elevation seat in traveling position.
Ammunition handler No. 1.	He places the platform rest in traveling position and, when gun is traversed and depressed properly, clamps the gun to the muzzle rest. Assists Nos. 2, 5, and 6 to fold the front sections of the platform and to lock them in position.	No duties.	Takes post at end of right front outrigger.	Bears down on the end of right front outrigger while the jacks are run down enough to replace the rear bogie.	He assists Nos. 2, 5, and 6 with the front outriggers and takes post at right wheel of front bogie.	He assists the fuze range setter, gunner, and Nos. 2, 5, and 6 in replacing front bogie. Tightens bogie clamps. He replaces additional equipment at direction of the gun commander.
Ammunition handler No. 2.	He assists Nos. 1, 5, and 6 to fold the front sections of the platform and to lock them in position.	No duties.	Takes post at end of left front outrigger.	Bears down on the end of left front outrigger while the jacks are run down enough to replace the rear bogie.	He assists Nos. 1, 5, and 6 with the front outriggers and takes post at the left wheel of the front bogie.	He assists the fuze range setter, gunner, and Nos. 1, 5, and 6 in replacing the front bogie. Assists No. 3 in connecting the electric brakes on the front bogie. Tightens bogie clamps.
Ammunition handler No. 3.	He assists the gunner, the fuze range setter, and No. 4 to fold the rear sections of the platform and to lock them in position.	He takes post by the rear outriggers.	Assists the gunner, the fuze range setter, and No. 4 in driving the wedges out of the rear outriggers and in folding and clamping those outriggers in traveling position.	He takes post at the right wheel of the rear bogie.	He assists the azimuth setter, gunner, fuze range setter, and Nos. 4 and 6 in maneuvering the rear bogie. Tightens bogie clamps.	Assisted by Nos. 2, he connects the electric brakes on the front bogie.
Ammunition handler No. 4.	He places the muzzle rest in traveling position. He assists the gunner, the fuze range setter, and No. 3 to fold the rear sections of the platform and to lock them in position.	He takes post by the rear outriggers.	Assists the gunner, the fuze range setter, and No. 3 in driving the wedges out of the rear outriggers and in folding and clamping those outriggers in traveling position.	He takes post at the left wheel of the rear bogie.	He assists the gunner, the fuze range setter, the azimuth setter, and Nos. 3 and 6 in maneuvering the rear bogie. Tightens bogie clamps.	He assists the fuze range setter in connecting the electric brakes on the rear bogie.
Relayer No. 5.	He assists the gunner to place the breech cover over the breech. Assisted by Nos. 1, 2, and 6, he folds the front sections of the platform and locks them in traveling position.	He assists the azimuth setter in maneuvering the right lifting jack.	No duties.	He assists the azimuth setter in maneuvering the right lifting jack.	After the rear bogie is replaced, assisted by Nos. 1, 2, and 6, he removes the wedges in the front outriggers and folds and clamps those outriggers in traveling position. He then takes post at the drawbar of the front bogie.	He directs the placing of the front bogie under gun, aided by the fuze range setter, the gunner, and Nos. 1, 2, and 6. He then assists the gunner to replace the jack float channel in traveling position.
Fuze setter operator No. 6.	He replaces the muzzle cover, and assists the fuze range setter in handling the fuze setter and fuze setter bracket. He assists Nos. 1, 2, and 5 to fold the front sections of the platform and to lock them in traveling position.	No duties.	No duties.	No duties.	He assists the azimuth setter, the gunner, the fuze range setter, and Nos. 3 and 4 in maneuvering the rear bogie. After rear bogie is replaced, assisted by Nos. 1, 2, and 5, he removes the wedges in the front outriggers, and folds and clamps these outriggers in traveling position. He then takes post at drawbar of front bogie.	He assists the fuze range setter, the gunner, and Nos. 1, 2, and 5 to replace the front bogie. He replaces additional equipment at the direction of the gun commander.
Ammunition squad, Nos. 7 to 15, inclusive. (See note 3.)	Nos. 7 to 15, inclusive, under the supervision of the chief of ammunition, perform such duties in salvaging ammunition and quitting the emplacement as may be directed.	As directed.	As directed.	As directed.	As directed.	As directed.

Caution: Care should be exercised that the rear leveling lever is not moved while the gun is secured to the traveling lock, as such movement will damage the elevating mechanism assemblies.

NOTES

1. The end of the mount equipped with the muzzle rest is the rear of the mount. Due to interference of various members of the mount and bogies, it is not allowable to put the mount in traveling position so that the muzzle of the gun points forward when traveling, although the bogies are interchangeable. The bogie equipped with the lunette is the front bogie and will always be placed in position at the front of the mount (breech end of gun).

2. The mount M2A1, unless modified after issue, is equipped with pneumatic type (air) brakes. References to electric brake connections should be changed in this case to read "air hose connections" when applied to rear bogies and eliminated when applied to front bogies.

3. This table is for the organization of a mobile unit. For semimobile units, the numbers of the ammunition squad are from 7 to 12, as three chauffeurs are not included in the organization of this type unit.